Research Issues 34

CORRELATES AND CONSEQUENCES OF MARIJUANA USE

National Institute on Drug Abuse

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Alcohol, Drug Abuse, and Mental Health Administration

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Edited by:
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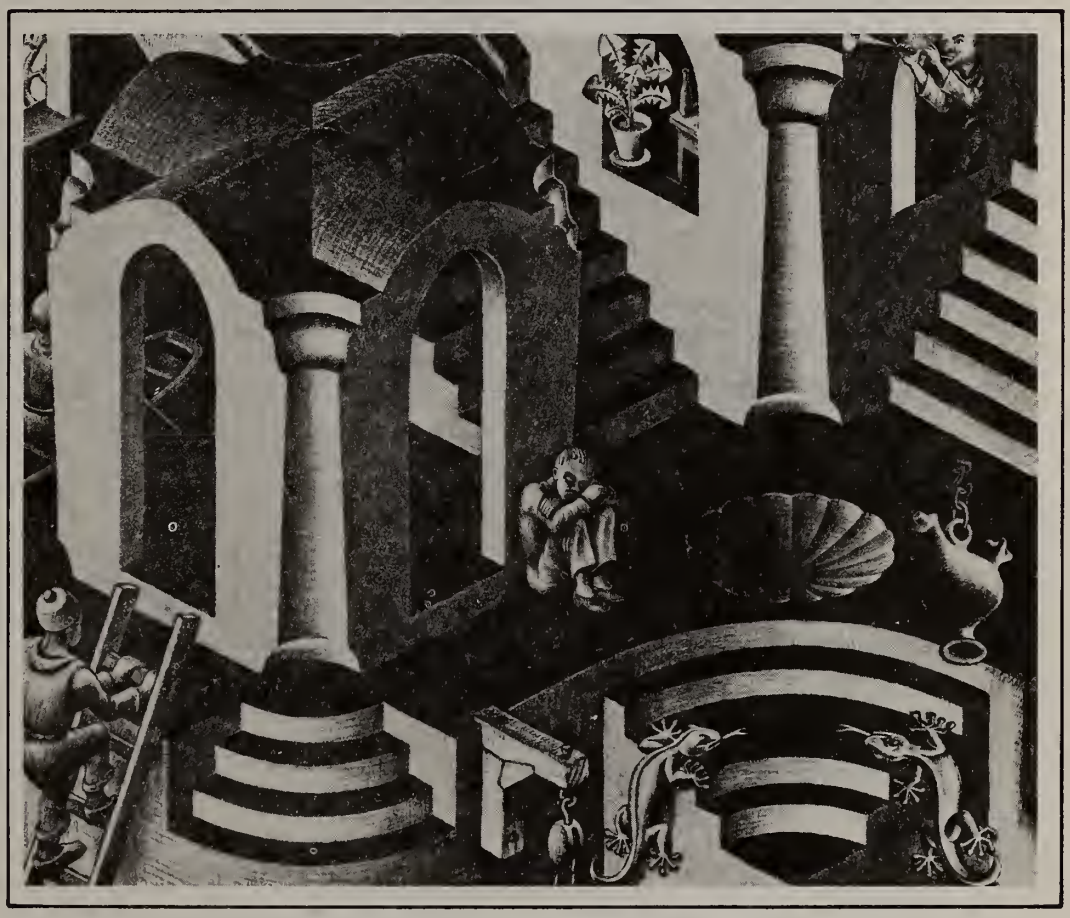

1984

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Foreword

The critical issues involved in drug use and abuse have generated many volumes analyzing the "problem" and suggesting "solutions." Research has been conducted in many disciplines and from many different points of view. The need to bring together and make accessible the results of these research investigations is becoming increasingly important. The Research Issues Series is intended to aid investigators by collecting, summarizing, and disseminating this large and disparate body of literature. The focus of this series is on critical problems in the field. The topic of each volume is chosen because it represents a challenging issue of current interest to the research community. As additional issues are identified, relevant research will be published as part of the series.

Many of the volumes in the series are reference summaries of major empirical research and theoretical studies of the last 15 years. These summaries are compiled to provide the reader with the purpose, methodology, findings, and conclusions of the studies in given topic areas. Other volumes are original resource handbooks designed to assist drug researchers. These resource works vary considerably in their topics and contents, but each addresses an area of emerging concern in the research world.

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Preface

The field of marijuana research is a relatively young one. Despite this, the literature is fairly large and difficult to master. This volume, which is limited to research on humans, is intended to provide researchers with an up-to-date survey of the recent literature on the psychological and social correlates and consequences of marijuana use. Works of a biomedical nature are as a rule considered outside the scope of this volume.

Originally, the volume was planned to focus only on the consequences of marijuana use, but it soon became clear that much of the research on marijuana use that had identified factors associated with its use had not succeeded in differentiating consequences from antecedents and concomitants. Research capable of such differentiations is often difficult and demanding of resources not typically available to researchers in a relatively new area. Some of the research that has been done in the past 5 years has been able to identify consequences of marijuana use, and every effort was made to include in this volume as much of this literature as possible. Many of the studies that reported correlates that may be consequences are also included, as are a number of studies reporting antecedents. The volume is intended to deal primarily with the long-term consequences of marijuana use. However, since so many of the known short-term or acute effects may have longer term consequences or may have cumulative long-term effects, a number of reports dealing with acute effects are included. Similarly, although the volume emphasizes the consequences of chronic or high frequency/high quantity use, some of the reported consequences of occasional use are also included as they may sometimes be quite serious and have long-term implications.

The volume has three main parts. In the first, Robert Petersen reviews the literature on the psychological and social correlates and consequences of marijuana use and provides an integrative summary of what is currently known. He has also included a brief summary of the biomedical consequences of marijuana use because it is believed that these consequences are interrelated with, and have implications for, the psychological and social sequelae. The overview portrays the current, available human research-based information on the correlates and consequences of marijuana use.

The second part of the volume contains 127 abstracts of both representative and significant research and theory on the psychological and social correlates and consequences of marijuana use. The articles and studies selected for abstracting are drawn primarily from the American empirical human research literature published between 1974 and 1981. The abstracted publications, primarily scientific journal articles, are intended to be a collection of the most significant and representative research and theory on the psychological and social correlates and consequences of marijuana use. Each abstract attempts to be a faithful representative of the original published report. The abstracts are arranged in chronological order beginning with the more recent ones. Within year, abstracts are listed alphabetically. An index to the abstracts is included.

Researchers who served on the peer review panel, listed on the following page, provided critical advice on the selection of articles and studies. The final selection of articles to be abstracted, however, was made by the editor.

The third part of the volume consists of an extensive bibliography of the relevant recent psychological and social literature. This bibliography was compiled from references identified by Debra Laser, of Metrotec, Inc., the peer review panel, and the editor. There is an extensive index to this bibliography. Works that were identified and/or published after the literature search for the bibliography was completed are included in the supplementary bibliography.

Input and assistance on all aspects of the volume were provided by the Research Issues Series managing editor, Thomas J. Glynn, Ph.D., now with the National Cancer Institute, and the originator of the series, Dan J. Lettieri, Ph.D.

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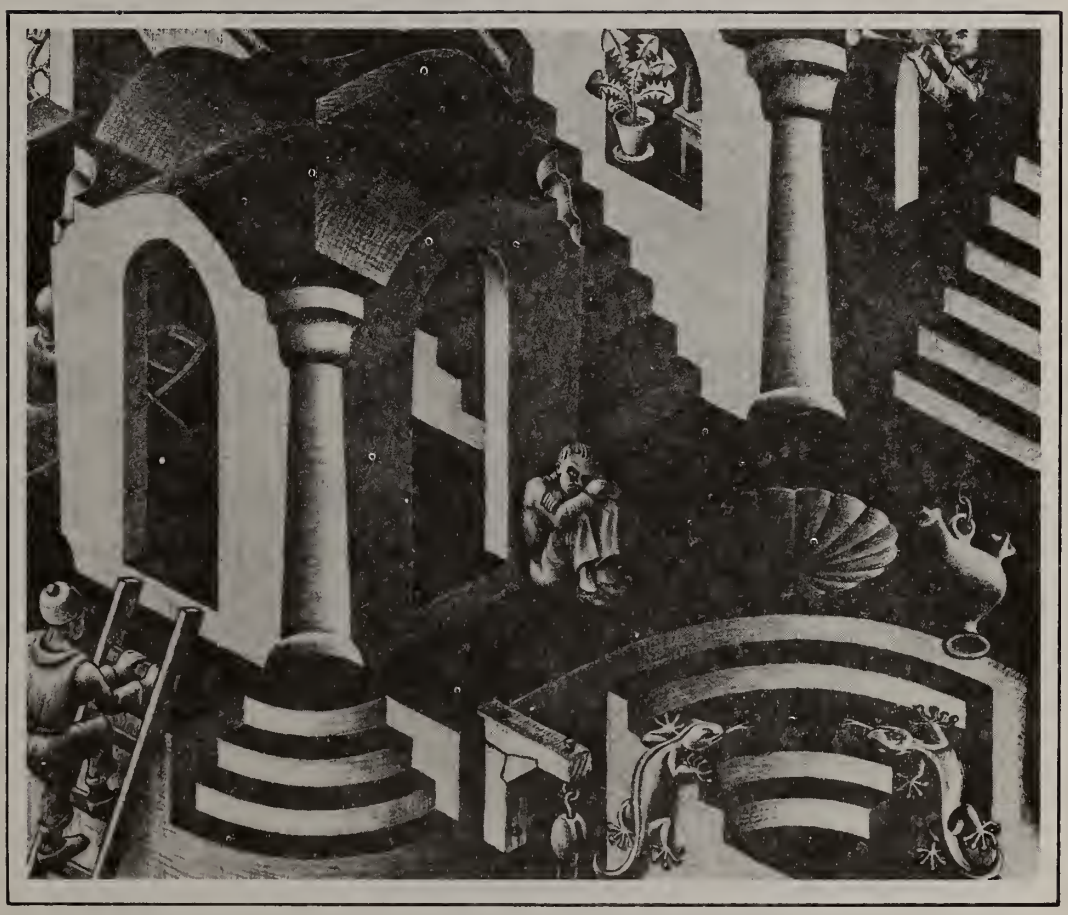

Marijuana Overview

Robert C. Petersen, Ph.D.

Marijuana research has been controversial since the inception of the modern era of cannabis investigation in the mid-1960s. This is hardly surprising. Given the concern about the millions of children and youths using marijuana, it was almost inevitable that such research would be the source of widespread misunderstanding. Although the controversy has been most heated among the general public, scientists, too, have become embroiled. Even those who should have known better have sometimes taken an uncritical view of seriously flawed research consistent with their personal prejudices and have ignored creditable studies that conflicted with their preconceptions. The desire to achieve premature certainty about this controversial substance has also led many to ignore much that we know about drug effects more generally and about the importance of dose, frequency, and circumstances of use in determining the use implications of a drug. No drug, taken in small enough quantities, is inevitably toxic, and few drugs are completely nontoxic at high doses.

Part of the difficulty in interpreting findings is that many years of use by millions are often required for use implications to become clear. Animal data and limited human laboratory experimentation can provide some evidence of long-range consequences, but these are often inconclusive. Cigarette smoking is an apt example. Smoking cigarettes on a mass scale began about the time of World War I, with the advent of high-speed machinery to produce them and the growing awareness that cigarettes were more convenient than cigars and pipes. And, unlike traditional modes of tobacco use, which were viewed as "unladylike," cigarette smoking by women soon became acceptable. However, it was not until 50 years after the initial upsurge in cigarette use that sufficient evidence of serious health effects was amassed for the Surgeon-General to issue the first smoking and health report (U.S. Public Health Service 1964). The bulk of the evidence linking cigarette smoking with many kinds of disease is epidemiological--that is, based on a statistical association between smoking and disease in many thousands of persons in the general population. While this in no sense indicts epidemiological research, it underscores the difficulty of anticipating the health impact of a substance before use has become well established, when it may be extremely difficult to discourage use.

As was true of early tobacco use, many thoughtful clinicians are convinced that marijuana has serious health implications, although many of its possible chronic effects are still unproven. Clinical evidence of a causal association between a substance and a set of symptoms is usually initially based on a small number of patients who have sought medical attention and in whom the symptoms are found to be associated with some aspect of their lifestyle or their exposure to the presumptive disease agent. With cigarettes, pulmonary surgeons suspected a carcinogenic role as early as the 1930s based on their observation that almost all their lung cancer patients smoked (Muller 1939). But since not all smokers develop lung cancer, it required the study of much larger numbers of smokers and nonsmokers to verify that smokers' overall rate of lung cancer is many times that of the nonsmoker.

Widespread use of cannabis, particularly on a habitual basis, is little more than a decade and a half old. Initially, use was largely limited to young adults occasionally using marijuana that had a lower potency than that currently being used. Early attempts to determine its possible adverse effects compared these occasional users collectively with nonusers. Such a comparison was as unlikely to detect marijuana-related health effects as would be a comparison of occasional cigarette smokers with nonsmokers. When intensity of use was taken into account, it was--and still is--usually defined by drug use frequency with little distinction made in the actual quantities consumed.

For convenience, marijuana has often been studied in isolation from other drugs. Frequently, its principal psychoactive ingredient, delta-9-tetrahydrocannabinol (THC), is isolated and administered orally to humans or animals. Although there are good arguments for studying marijuana in this way, it is not the way in which cannabis is usually consumed. Marijuana is generally smoked and is quite commonly used concurrently with alcohol, tobacco, and frequently other illicit drugs as well. This is especially true for the heavy user. THC is only one of several hundred ingredients in marijuana smoke, and the smoke contains several dozen additional chemical compounds that are unique to marijuana. Much less is known about the action of these other chemicals, although they are thought to modify THC's psychological and toxic effects as well as to have effects of their own (Turner 1980).

The "drug scene" is a rapidly changing one. There is good reason to believe that today's marijuana is significantly more potent, that is, higher in THC content, than the cannabis available as recently as 5 years ago. Street samples exceeding 1 percent THC were fairly uncommon at that time; samples with a THC content of 5 percent or more are now common (C.E. Turner, personal communication 1981). Systematic experimental study of marijuana in humans has generally used weaker material than is now available. Research based on older users smoking less potent varieties of marijuana may have little relevance to the use of stronger cannabis by young children and adolescents today.

Since cannabis use has been traditional in some cultures for hundreds of years, there have also been attempts to study its effects in those societies using modern research methods. The appeal of studying traditionally using groups is obvious; the limitations of such research may not be. Groups studied typically consist of men in middle life, since almost all traditional users are male. This is in marked contrast to the large numbers of children, adolescents, and females using marijuana in contemporary America. Moreover, there is reason to believe that traditional users' concurrent use of tobacco--the two substances are frequently smoked simultaneously as a mixture--leads them to inhale less deeply and to retain the smoke in their lungs for shorter periods than does the American user (Petersen 1979). A roughly analogous case is pipe versus cigarette smoking, in which the health effects are importantly different. If the analogy holds for traditional versus nontraditional cannabis use, it would not be surprising if traditional use were less hazardous to health. Even where cannabis-related health problems or dysfunction have been reported in traditional settings, it is uncertain what role cannabis plays compared to that of poor nutrition. Frequently, among the poorest segments of the society, the cost of users' cannabis supply may reduce the amount of money available to support an already poor dietary standard. Traditional users are also frequently employed in intellectually undemanding roles in agrarian societies in which any effect on thinking may be less important than it would be in a highly industrialized urban culture.

The many limitations characteristic of cannabis research that we have briefly outlined here often make the interpretation of the world's medical and scientific literature concerning the drug difficult. Although there are more than 8,000 articles dealing with some aspect of cannabis, many of these are of only marginal relevance to contemporary use patterns by American users. Many would not meet present-day scientific standards for research adequacy. Some represent little more than undocumented assertions about the putative effects of cannabis use without regard to other possible causal factors that may have played a role in the symptom pictures described. A much smaller number of studies are based on modern research methods that adequately specify the material used and take into account other contributing factors relevant to the clinical picture observed.

Even the best of contemporary research leaves many important questions unanswered, particularly with regard to the longer term consequences of use. As a result, there is a considerable danger that the absence of adequate evidence for a possible effect may be interpreted as an indication that such an effect is unlikely. As evidence from other widely used toxic substances, such as alcohol and tobacco, so amply demonstrates, clinical impressions are sometimes more accurate as a distant early warning of potential health hazards than is the much more modest amount of research data available when a substance initially becomes popular.

EPIDEMIOLOGY OF MARIJUANA USE

Although there have been many local, State, and national surveys done over the past two decades to determine the nature and extent of American marijuana use, only two of these provide trend data that are likely to be of more enduring national significance. (Others, of course, provide

important and useful information about correlates and predisposing factors related to use.) The first of these, the National Household Survey, is based upon interviews with a random sample of persons 12 years old or older living in households in the coterminous United States. It was conducted in 1971, 1972, 1974, 1976, 1977, 1979, and, most recently, in 1982 (National Institute on Drug Abuse, in press, a). The data were collected in a generally uniform fashion and thus provide good trend information for a decade of heightened American drug use. A second important survey source is an annual study of a random sample of high school seniors that was begun in 1975 and has been done annually each year since (the latest, Student Drug Use in America, 1982, National Institute on Drug Abuse, in press, b). Questionnaires are administered to high school seniors and to a portion of the original respondents in subsequent years. This provides not only a cross-sectional picture of American youths at a point of transition but also an opportunity to learn about changes in their drug use over time. Although both these national surveys are well designed and executed, they do have limitations that should be kept in mind in interpreting their results. Since the national household survey is confined to those living in household units and the high school senior survey to those still enrolled in high school in their senior year, some important groups are omitted. These include persons without regular addresses or those living in institutional settings such as dormitories and military bases, or transients. School dropouts and chronic absentees are likely to be omitted in the high school senior survey. Some of those missed may have atypical rates of marijuana (or other) drug use. We know, for example, that school absentees and dropouts are likely to have significantly higher rates of marijuana use than their peers who are still attending regularly (Kandel 1975).

Although a detailed discussion of the findings of these and other surveys can be readily obtained elsewhere, some of their highlights are worth summarizing:

- Both marijuana experimentation and current use (within the month preceding the survey) have increased markedly since the 1960s. Between 1971 and 1982, the latest year for which data analysis is complete, the percentage of youths (ages 12 to 17) who had ever used nearly doubled--from 14 percent to 27.3 percent. Among those ages 18 to 25, an increase of over 50 percent occurred in the same period--from 39.3 to 64.3 percent. The percentage of those currently using (i.e., those reporting use in the 30 days prior to the survey) is roughly half that of those who have ever used. This has been a consistent pattern over time for young adults and adolescents.

- Among high school seniors, nearly half (47.3 percent) of the class of 1975 had experimented with marijuana, compared with about 60 percent of the classes of 1978 to 1982. As with other adolescent and young adult groups, the percentage of current users is approximately half that of those who have ever tried the drug.

- Daily use has not been surveyed in the National Household Survey, but among high school seniors, it rose from 6 to nearly 11 percent between 1975 and 1978 and has since fallen to 6.3 percent in the class of 1982.

- Use among those older than age 25 is much lower than among those younger. Only 6.7 percent of those 26 and over reported current (past month) use of marijuana in 1982, compared to 1.3 percent in 1971.

Other significant aspects of use have been found in these and other studies. For example:

- The lower the age of initial use of alcohol and cigarettes, the more likely the individual is to use marijuana (Rittenhouse 1980).

- Age of first use of marijuana has steadily decreased. A little over a third (37 percent) of the high school senior class of 1975 had used marijuana prior to the tenth grade, but just over half (51 percent) of the class of 1981 began use that early (National Institute on Drug Abuse, in press, b).

- "Daily" use (20+ days per month) is positively correlated with absenteeism and poor school achievement among high school seniors and negatively correlated with religious involvement and plans for college attendance (Johnston 1980).

- Seniors who spend little time at home are more likely to be daily users than are those less socially active--of those who are out six nights per week on dates, a third use marijuana daily (Johnston 1980).

- Daily-using seniors are much more likely to use other drugs than are less frequent users--nearly half (47 percent) currently use amphetamines; nearly a third (31 percent) currently use cocaine (Johnston 1980).

PSYCHOSOCIAL CORRELATES OF MARIJUANA USE

The concern that marijuana use might play a role in social deviance or in other forms of impaired psychosocial functioning has led a number of researchers to study the correlates of use. By "correlates" is meant those behaviors, attitudes, and interpersonal patterns together with social demographics that are associated with marijuana use. A number of longitudinal and cross-sectional studies have now found that use, especially heavy use, is associated with such characteristics as poor academic performance and low academic motivation, various kinds of delinquent behavior, problems with authority, and a lack of self-esteem (Jessor and Jessor 1977; Kandel 1978a; Kellam et al. in press). The most striking aspect of these findings is that they have typically been found to precede drug use rather than to be the result of such use. This is in contrast to individual case studies, which frequently have observed that use itself, particularly at higher levels, results in diminished motivation and performance. The explanation may lie in the differences between studies of those who have sought treatment or been referred because of their drug-related problems as opposed to studies of more general population samples. This is not unique to marijuana. Even with drugs that are known to have causal significance in deviant behavior and diminished performance, such as alcohol, many heavy users do not show these effects even though they may be evident in users seeking or referred to treatment for drug-use-related problems. The fact that not every heavy user shows obvious use-related problems does not, of course, prove that a drug does not have serious adverse effects on more susceptible individuals.

Among the predictors of future marijuana and other drug use that have been found in longitudinal studies are such characteristics as rebelliousness (often reflected in rejection of parental and school authority), a dislike for school, a sense of alienation, normlessness, truancy, and the like. Prospective users place a higher value on independence than they do on achievement and tend to be more peer-oriented than parent-oriented in their value systems. They tend to have more positive attitudes toward the use of legal drugs such as alcohol and tobacco and are likely to be earlier users of such drugs than their peers. They are also likely to have lower self-esteem, a lower sense of psychological well-being, and greater degrees of personal dissatisfaction and depression (Kandel et al. 1978; Smith and Fogg 1978; Kandel 1973).

Studies that have focused specifically on delinquency, deviance, and drug use have found that such behavior as theft and vandalism, lying, and interpersonal aggression are more characteristic of future drug users than of nonusers. By contrast, youngsters who are more conventional in their values, who are more religious, and who espouse more traditional academic and vocational achievement goals are less likely to become drug involved at an early age or on an intensive basis.

One of the most consistent findings is that an individual's drug use is highly correlated with that of his or her peers. Users are much more likely than are nonusers to have friends who are users. In fact, they are more likely to resemble their friends in their drug use than in almost any other dimension except for age and sex (Kandel 1978b). The more extensive the individual's involvement in the peer culture, the greater the likelihood of marijuana use on a regular basis. Thus, adolescents who date extensively, who spend most of their free time with their peers, and who feel remote from their parents are more likely to be regular users than are those less peer oriented (Johnston et al. 1980).

Another question of enduring interest has been the extent to which marijuana use plays a role in the subsequent or concurrent use of other illicit drugs. Statistically, there is little question that use, particularly heavier use, is associated with a greater likelihood of experimentation with other drugs. This is also true of use of alcohol and cigarettes. Those who use alcohol and tobacco are far more likely to begin using marijuana early and to use it more extensively than those who do not. The role of these nominally legal drugs as "gateway" substances to later illicit drugs has led to a reappraisal of prevention strategies primarily emphasizing the prevention of illicit drug use and to a recognition that the use and abuse of both types of substances cannot readily be separated.

As national surveys have clearly indicated, over the past 20 years there has been a marked increase in the acceptability of occasional marijuana use among adolescents and young adults, although there has been some degree of increasing disapproval since 1980. Nevertheless, there is good evidence that heavier use is not approved by the majority. In fact, the percentages of high school seniors who view regular marijuana use as posing "great risk" have significantly increased over the past several years. While 35 percent of the class of 1978 viewed regular use as posing great risk, 58 percent of the class of 1981 perceived it as such (Johnston et al. 1981).

Although the studies briefly reviewed here have enhanced our understanding of the correlates of marijuana use, it should be emphasized that the periods of time over which users and prospective users have been studied have been relatively brief--rarely exceeding 5 years. While some research done on older users (post-college age) suggests that use drops with the assumption of adult roles such as marriage, parenthood, and full-time employment, much remains to be learned about drug-use careers and just how the various factors interact in affecting drug use (O'Donnell et al. 1976). Another important consideration is the rapidly changing nature of the "drug scene" itself. Marijuana use has shifted from a clearly minority behavior closely associated with social deviance to a majority behavior (at least on an "experimental" basis) and may now in 1983 be again becoming less acceptable, judging by the attitude shifts that have been reported. Since the nature of the drug itself has also changed, it is also possible that future studies may find greater evidence that heavier marijuana use is not only a part of a larger pattern of social deviance but that it contributes to such deviance to a greater extent than earlier longitudinal studies indicate.

ACUTE PSYCHOLOGICAL EFFECTS OF MARIJUANA INTOXICATION

Uncertainty over the implications of chronic marijuana use should not obscure the basic agreement concerning the drug's immediate intoxicant effects. While marijuana intoxicated ("high"), the user shows many indications of impaired psychological functioning, including effects on memory, thinking, speaking, various kinds of problem solving, and concept formation. Early clinical descriptions of these effects are strikingly similar to more recent experimental observations of the past decade. Most of these effects seem to share in common an impairment of short-term memory, which leads to fragmented speech, disjointed thinking, and a tendency to lose one's train of thought (Institute of Medicine 1982).

Many specific types of performance are impaired. Examples include digit/symbol substitution, in which the subject is required to replace a series of random digits with symbols representing each digit; the number of orally presented digits that can be recalled (digit span); serial subtraction, in which the subject subtracts a number repeatedly from an initially large number; and reading comprehension. Time perception is also affected and is reflected in an overestimation of elapsed time intervals. Most users are aware of this tendency to distort time (Ferraro 1980).

As with other drugs, marijuana's effects are dose related. The higher the dose, the more likely that performance disruption will occur. At least with simpler tasks, experienced users become tolerant of the drug's psychological effects and when strongly motivated may be able to attenuate the drug's effects (Cappell and Pliner 1974). Most laboratory research has been done with experienced users who are highly motivated to perform well so as to demonstrate that use is not disruptive. Under more usual conditions, performance might be expected to be poorer than in the laboratory.

Research has been done primarily with young adult males. Systematic research has not been carried out on the effects of marijuana use on much younger users or on how it affects classroom functioning directly. If anything, however, effects on younger users might be expected to be still more disruptive than effects on older users, and the similarity of classroom tasks to those experimentally investigated leaves little doubt that marijuana is likely to interfere with classroom learning. The more complex, unfamiliar, and demanding the task to be performed, the greater the likelihood that being high will cause impairment.

Marijuana use also produces acute effects on perception, affect, and social interaction. Perceptually, users typically report a heightened awareness of visual, auditory, and tactual sensations (Goode 1970). This subjective enhancement of sensation is usually seen as desirable, and coupled with the time distortions alluded to earlier, it may be responsible for the reported enhancement of sexuality. The latter may also be a response to a generally disinhibiting effect of marijuana similar to that of alcohol. Like alcohol, however, higher doses may be sedative and may reduce responses.

Unlike the alterations in time perception that can be measured in the laboratory, the enhancement of other types of sensation has not been detected experimentally. There is no evidence that improved auditory or visual acuity, for example, results from marijuana intoxication. Despite marijuana's street reputation as a social facilitator, laboratory research indicates that even at moderate doses communication is impaired by the intrusion of irrelevant ideas and words and that there is even greater disruption at higher doses (Dornbush et al. 1971; Miller and Cornett 1978; Paul and Carson 1973).

ACUTE PHYSIOLOGICAL EFFECTS

The most obvious--and well verified--effect of marijuana on humans is a dose-related temporary increase in heart rate, which may become as high as 160 beats per minute (Beaconsfield et al. 1972; Perez-Reyes et al. 1973). In animals, by contrast, heart rate in response to marijuana is often slowed (Cavero et al. 1972). Blood pressure levels while the subject is standing tend to drop but typically remain unchanged or even increase slightly while the subject is sitting or reclining (Beaconsfield et al. 1972). In the past, the acute increase in heart rate accompanying use has been viewed as benign. More recently there has been concern that it may have more serious implications for those who are older or who already have impaired heart functioning. In patients with angina pectoris--chest pain as a result of poor cardiac circulation--there is evidence to indicate that they experience such pain more rapidly and following less exertion after smoking marijuana cigarettes than after smoking conventional cigarettes (Prakash and Aronow 1976). Most recently (1982), health scientists at the National Academy of Sciences' Institute of Medicine who comprehensively reviewed marijuana's health effects suggested that marijuana use may become a threat (as the user population ages) to those with hypertension, cerebrovascular disease, and coronary atherosclerosis (Institute of Medicine 1982).

Conjuctival congestion, a reddening of the eyes, is also a common physiological reaction to acute marijuana use. That this effect is not simply a result of the irritating effects of the smoke is indicated by its occurrence even when the drug is orally ingested.

Effects on Psychomotor Performance

When we turn to research on various aspects of psychomotor coordination and performance, there is generally good agreement about the acute effects of marijuana. As early as 1944, work done for the New York Mayor's Committee on Marihuana found that hand steadiness, measured by the ability to hold a stylus within a small hole without touching the hole's sides, was reduced. "Body sway" while standing erect was also increased (Mayor's Committee on Marihuana 1944). More recent variations on these original experiments using better specified doses of marijuana have been generally consistent with the earlier experiments (Clark et al. 1970; Evans et al. 1973; Kiplinger et al. 1971). Reaction time experiments have had varying results depending on the complexity of the task demands. When the experiment has demanded an uncomplicated response to a simple stimulus, say pressing a key in response to a light or sound, marijuana has been found to have little effect (Borg et al. 1975). But when the research task has required complex discrimination or complex responding or when the task required continuous attention, performance was impeded in a generally dose-related fashion (Clark et al. 1970; Moskowitz and McGlothlin 1974; Peeke et al. 1976). What appears to be involved in these experiments is not reaction time as such, but the task's demands for continuous attention or more complex information processing.

Tracking, the ability to follow a moving stimulus, which requires continuous rather than intermittent attention, is a good example of an experimental task impaired by marijuana intoxication. It is an important function since it is involved in driving, flying, and many other types of man/machine interactions. In critical tracking, in which task difficulty is increased until the subject is unable to track, deficits in performance have been found for as long as 10 hours after initially becoming high, long past the period of subjective intoxication (Moskowitz et al. 1981).

In experiments in which subjects detect and respond to peripheral light cues in their visual field, performance is adversely affected by marijuana (Casswell and Marks 1973; Moskowitz et al. 1972). Such defects in signal detection may have practical significance in driving and similar man/machine interactions requiring alertness to peripheral visual cues.

Driving Studies

Because of its practical importance, driving behavior as related to marijuana use has been studied in a variety of ways. These include experiments that more closely resemble the complex demands of actual driving than do reaction time and other simpler performances; driving-simulator performance as well as driving on test courses and under actual traffic conditions have been investigated.

Virtually all simulator research has found clear deficits in performance related to marijuana intoxication. In general, the more closely the driving-simulator demands have resembled those of actual driving, the greater the disruption resulting from performing while high. The greatest effect has been on response to the perceptual demands of driving rather than on car control variables. However, there is good experimental evidence that the resistance of such control variables as braking time and tracking may be an artifact of the rather simple demands of most simulators. In an interactive, computer-controlled simulator in which performance more closely resembled actual driving, more serious marijuana-induced deficiencies were found (Smiley et al. 1981). In this more realistic experimental model, marijuana use produced significant variability in the control of car velocity and poorer car positioning when responding to simulated wind gusts and negotiating curves. The ability to maintain following distance was also affected, as was the ability to maintain lane position. "Drivers" were also likely to make errors in responding to route signs while high. Their responses to simulated emergencies were impaired to an extent that would have produced accidents in actual driving. Overall, the simulator studies clearly indicate that marijuana impairs driving performance in ways that have serious practical consequences for traffic safety.

A study of pilot behavior while marijuana-intoxicated using a flight simulator found serious disruption of psychomotor and cognitive functioning involved in piloting an aircraft under instrument flying conditions (without visual flight cues outside the aircraft). Following social doses of marijuana, pilots had difficulty in maintaining their flight pattern and often forgot just where they were in the flight sequence. Performance of those pilots who were tested for several hours after initial marijuana intake did not return to normal until 4 hours after smoking. The authors of this study point out that the simulator flight test was simpler than many flying situations, and still greater impairment might be expected in actual flight (Janowsky 1976; Janowsky et al. 1976).

There have been several attempts to determine marijuana's effects on driving under test course or traffic conditions. With the exception of one poorly reported study in which marijuana doses and other details of the experimental procedures are described too inadequately to evaluate the work, the remainder of the studies have all reported impaired performance. In a Canadian closed-course experiment, 12 male and 4 female subjects traversed a course of 1.1 miles, which was defined by poles and traffic cones, at a speed of 25 to 30 mph (40 to 48 km/hr). Marijuana, alcohol, and placebo were administered on a double-blind basis. The higher dose of marijuana and the alcohol dose (sufficient to produce a 0.07 percent blood alcohol level) produced performance impairment to about the same extent (Hansteen et al. 1976).

A second Canadian study using 43 male and 21 female subjects studied driving under closed-course and actual traffic conditions. In traffic, performances were rated on behavioral rating scales. At the higher of the two marijuana levels used, judgment and concentration were clearly impaired. Dose-related impairment was also found in five of eight tests used on the closed course (Klonoff 1974).

A third closed-course experiment was done at speeds approaching those of highway driving (up to 50 mph or 80 km/hr). Although the number of subjects was small (eight), the author reports that multivariate analysis showed that marijuana, alcohol, and a combination of the two all adversely affected performance (Attwood et al. 1981).

Since these experiments were done without the usual distractions of additional passengers in the car or a car radio or stereo, and with strong motivation to perform well, a greater impairment of performance might be expected under more ordinary conditions.

Attempts have been made to determine the role of marijuana in motor vehicle fatalities or highway accidents. A serious problem is encountered, however, in the measurement of blood cannabinoid levels in a way analogous to the measurement of blood alcohol levels. Blood cannabinoid levels drop within minutes of smoking and by the end of two hours may have decreased to a level below that at which they can readily be detected. Moreover, unlike blood alcohol levels, blood cannabinoid levels are not clearly correlated with reduced performance. Finally, quantitative analysis

requires blood samples, which accident-involved drivers are often unwilling to supply. Blood alcohol determinations can be based on urine or breath analysis, and although urinalysis can determine whether marijuana has been used within several days of an accident, at present there is no way of determining a direct connection between the use of marijuana and the accident.

Despite these limitations, there have been several studies indicating that marijuana, like alcohol, plays a causal role in the production of motor vehicle fatalities and accidents. Perhaps the most ingenious of these utilized an "index of culpability" to measure the role of several drugs in motor vehicle accidents. The frequency with which each drug was found in the blood of drivers judged responsible for an accident was compared with that for drivers in the same sample who were not found responsible. The index ranged from 1, meaning a drug is not related to accidents, to 1.8, indicating a much greater use frequency in those found culpable. Using this method, marijuana was found to have a culpability index similar to that for alcohol (Warren et al. 1981). A very recent (1982) study of teenage driving after using marijuana or alcohol found that teenagers who drove 6 or more times per month after smoking marijuana were 2.4 times more likely than those who did not to have been involved in traffic accidents. Still heavier users (driving 15 or more times per month after marijuana use) were 2.9 times more likely to have had an accident. These figures are based on a random telephone survey of nearly 6,000 16- to 19-year-olds in which appropriate controls were used for the number of miles driven, age, sex, education, and whether those queried were married, students, or living with parents (Hingson et al. 1982b).

While these studies suggest that marijuana is a significant factor in accidents, much more needs to be done to better specify its role in causing accidents. The few studies done to date probably underestimate the frequency with which marijuana is involved because of the drug-use detection problem and the likelihood that self-reports underestimate the role of marijuana use in impaired driving.

CHRONIC EFFECTS

The brevity of the American experience with large-scale marijuana use and the extended period often required for chronic effects of drug use to become apparent makes this an area in which our present knowledge is most clearly deficient and inconclusive. As already noted, heavier users of marijuana are likely to make extensive use of other licit and illicit drugs, making the chronic implications of their marijuana use difficult to isolate.

Respiratory Effects

Because marijuana smoke is deeply inhaled, retained in the lungs, and contains many ingredients similar to those in tobacco smoke, adverse respiratory effects are to be expected. Such effects have been clinically reported among traditional users in the older clinical literature (Indian Hemp Drugs Commission 1969), and there is a range of more recent experimental and clinical research suggesting that marijuana has many effects similar to those of cigarette smoking. Unlike research on cigarettes, however, the body of data currently available is much smaller and less conclusive. No large-scale epidemiological studies have been done, and the still-small minority of heavy users who have used for periods of many years makes confirming these effects epidemiologically difficult.

Studies based on much shorter periods of exposure to marijuana have found lung effects ranging from the statistically but not practically significant (probably because of the brevity of exposure) to more serious respiratory problems reported by self-referred users of hashish. A study of normal volunteers after periods of up to 2 months of smoking an average of about five standard marijuana cigarettes found detectable decreases in specific airway conductance, forced expiratory flow, and diffusion capacity (Tashkin et al. 1976). Another study of moderately heavy street users who were compared with nonusers found evidence that such users showed greater effects from marijuana use than from comparable cigarette use (Tashkin et al. 1980). Given the facts that virtually the entire "joint" (marijuana cigarette) is consumed by deeply inhaling it and that the smoke is usually unfiltered, the greater effect is not surprising.

A study of 31 hashish-using American soliders in Europe, self-referred for physical reasons, found bronchitis, rhinophryngitis, asthma, and sinusitis all related to heavy use (100 grams per month for up to 15 months) (Tennant et al. 1971). A similar larger study of 200 self-referred soldiers found similar symptoms related to use. In a small subsample of this group, tissue biopsy

found bronchial changes similar to those found in much older heavy cigarette smokers (Auerbach et al. 1961). For 20 of the heavier hashish users, vital capacity was reduced to 60 to 85 percent of normal (Henderson et al. 1972).

Chronic studies of animals exposed to quantities of marijuana smoke that produced blood levels similar to those in human users found degenerative changes in the lungs (Rosenkrantz and Fleischman 1979). Other studies of human lung tissue in tissue culture have found malignant cellular changes after shorter periods of exposure to marijuana smoke than to tobacco smoke (Leuchtenberger et al. 1976).

The possibility that marijuana can ultimately produce lung cancer in humans is suggested by several types of additional research evidence. Chemical analysis of marijuana smoke indicates that it contains several chemical compounds similar to those found in tobacco smoke that are known to be carcinogenic (Novotny et al. 1976). Marijuana smoke residuals, like those of tobacco, cause skin tumors when applied to the shaved skin of experimental animals (Hoffmann et al. 1975). The fact that marijuana smokers are also frequently cigarette smokers may well pose an additional risk beyond that of either marijuana or tobacco smoked alone. The shorter life span in traditionally using countries and the lack of systematic studies of causes of mortality in those countries may have obscured the possible role of marijuana in lung carcinoma. Since lung cancer and other chronic lung diseases are usually diseases of later life, many person-years of exposure to marijuana may be needed before clear epidemiological evidence of a connection is demonstrated.

Reproductive Effects

Because marijuana users are largely either in or about to enter their reproductive years, a possible effect on reproduction has long been of concern. Some studies have found evidence of a reduction in testosterone levels in males. Where reductions have been found, they have generally been within normal limits (Kolodny et al. 1974; Cohen 1976). Even a modest reduction might, however, have significance for those whose endocrine functioning is marginal or possibly in younger users at the point of transition from childhood to adolescence. Clinical evidence of these theoretical possibilities has generally been lacking.

Diminished sperm counts found in some heavily using males may also have greater significance for those who are already marginally fertile. In a study of Greek users, evidence of abnormal sperm structure was found in some users, although its clinical significance is not clear (Issidorides 1979).

Work with animals has suggested that marijuana may have adverse reproductive effects in females, including the suppression of ovulation and altered progesterone levels. One study of female monkeys given dosages of THC that would be consistent with heavier human use found a greater incidence of reproductive failure than that found in drug-free animals (Sassenrath et al. 1979).

Research on human females has been quite limited. One study of 26 young women using unspecified street marijuana three or more times per week for 6 months or more compared these users with nonusers of similar age. While the authors reported a higher frequency of anovulatory menstrual cycles and a shortened luteal phase, which may be related to reduced fertility, the results must be regarded as suggestive at best. Users differed from nonusers in their level of alcohol use and of sexual activity, which may have affected the results (Bauman et al. 1979).

A recent study of fetal growth and development in 1,690 mother/child pairs in Boston found an association between marijuana use, lowered birth weight, and fetal abnormalities resembling the fetal alcohol syndrome. Although the exact causal role of marijuana, especially in conjunction with alcohol or tobacco use, is not clear, the authors conclude that "women who used marijuana during pregnancy were five times more likely to deliver infants with features considered compatible with the fetal alcohol syndrome." Because of uncertainty of causation, the authors "caution against the firm conclusion that marijuana use causes fetal growth retardation" (Hingson et al. 1982a). Despite the limitations of the research thus far completed, there is a consensus that marijuana use by women during pregnancy is particularly unwise.

A possible role of marijuana in mutagenicity has been suggested (Stenchever et al. 1974). Although the bulk of the better controlled research suggests that marijuana does not have mutagenic or cytogenic effects, research in this area must be regarded as incomplete, and the issue as still unresolved.

Effects on the Immune System

A variety of animal studies have suggested that marijuana may have an effect on the body's immune system, its principal defense against disease (Petersen and Lemberger 1976; Lefkowitz and Klager 1978; Pruess and Lefkowitz 1978). In humans, the data are clearly inconclusive. Some studies have found evidence of a diminished immune response in some users, but others have not (Gupta et al. 1974; Silverstein and Lessin 1974; Nahas et al. 1974; Petersen et al. 1976). There is no epidemiological evidence that marijuana users at any level of use are more frequently susceptible to disease that might result from an impaired immune response. But since such large-scale studies have not yet been done and most users are relatively young and have high degrees of immunity, such effects may not yet have been detected.

Chronic Effects on Brain and Behavior

A wide range of marijuana's effects make it apparent that the drug has acute effects on brain function. The question of whether continuing use leads to persistent changes in brain function or morphology is more difficult to answer at this time.

In 1971, a British study suggested that brain atrophy related to marijuana use had occurred in 10 multiple-drug users who had various neurological symptoms (Campbell et al. 1971). The facts that other drugs had been used and that there were other serious methodological deficiencies made the connection between marijuana use and brain damage tenuous at best. Two better controlled subsequent studies of healthy chronic marijuana users using a noninvasive technique for measuring the brain found no evidence of brain atrophy in any of the subjects studied (Co et al. 1977; Kuehnle et al. 1977).

A study of a very limited sample of monkeys treated with either marijuana smoke or intravenous THC has reported evidence of drug-related brain changes detectable by electron microscopy (Heath et al. 1979). The limited number of animals studied, the lack of replication, and some question of the significance of some of the changes reported all make the interpretation of these findings difficult. Even in the absence of structural changes in the brain, the possibility that marijuana produces persistent functional changes can not be dismissed. With other known neurotoxic drugs, such as alcohol, not all users are equally affected. There can be clear evidence of disturbed functioning, such as memory defects, despite lack of clear evidence of structural change.

Attempts have been made to study the effects of marijuana on the electrophysiology of the brain as measured by electroencephalography (EEG). While acute effects have been identified, these have neither been unique to marijuana nor chronically persistent in the absence of marijuana intoxication (Rodin et al. 1970; Fink 1976). Studies have also been done in traditional chronic user groups (Rubin and Comitas 1976; Karacan et al. 1976). These too have found no evidence of persistent EEG changes related to use, but since the samples chosen for study were screened on several health variables the possibility exists that the screening process itself eliminated those who might have shown such changes.

Clinical reports of isolated cases of abnormal EEG findings presumably related to marijuana use are difficult to interpret since any EEG findings may have preceded use or may have resulted from the use of other drugs or from other causes.

Behavioral Effects

A variety of adverse behavioral-psychological effects of marijuana have been described as resulting from acute and chronic cannabis use. Users frequently report reactions that are negative although not severe enough to seek medical or other outside assistance. These range from mild anxiety to acute panic reactions. Transient mild paranoid feelings are common (Tart 1970). Such reactions seem to be more frequent in inexperienced users who lose the perspective that what they are experiencing is a drug reaction rather than a basic change in their mentation. An acute brain syndrome marked by disorientation, confusion, and memory impairment has been reported (Spencer 1970; Talbott and Teague 1969). These acute reactions may occur when the individual ingests an unexpectedly potent variety of marijuana or uses the drug in larger quantities than usual. Since it is more difficult to self-titrate dosage when the drug is taken orally, overdoses from such use are probably more common.

In countries such as India, a cannabis psychosis has been described that resembles schizophrenia, although it is not clear whether this results from the drug use itself or is the product of an underlying schizophrenia exacerbated by the use of the drug (Chopra and Smith 1974). A cannabis psychosis has not been commonly reported in the United States, although there have been clinical reports that marijuana use in psychotic patients who were in remission has precipitated a recurrence of their schizophrenia (Treffert 1978; Smith and Mehl 1970). Most recently, a Swedish report (Palsson et al. 1982) has found an apparent causal link between heavy hashish use and a schizophrenic-like illness characterized by confusion, aggressiveness, and affective lability in individuals with little evidence of preexisting psychosis. The disorder appeared to be rare and disappeared in a period of weeks or months following cessation of cannabis use.

The question of whether long-term cannabis use produces a loss of conventional motivation and an inability to persist in achieving long-term goals--a so-called "amotivational syndrome"--has been raised both in countries of traditional use and with respect to contemporary American use. At one extreme, it appears likely that chronic marijuana intoxication interferes with functioning in this way. But the question of whether regular, heavy use at levels less than chronic intoxication causes this is more difficult to answer. For some, a lack of strong motivation to pursue long-term goals precedes drug use. But there are a number of clinical observers who are convinced that these motivational effects are directly related to use and that following cessation of marijuana use normal motivation may return (Kolansky and Moore 1971; National Institute on Drug Abuse 1982). It is also noteworthy that among high school seniors who discontinued use, over half did so because of their concern about use-related "loss of energy or ambition." Almost two out of five daily users in the class of 1981 thought their cannabis use caused a loss of interest in other activities and interfered with their ability to think. There has been little systematic study of the effect of chronic use on work performance in American populations, although there have been attempts to look at work functioning and social functioning in several populations of traditional users. The overseas groups studied showed little evidence of amotivation, but this may reflect a different mode of use or the lower demands involved, or it may be an artifact of the methods of subject selection.

Of paramount concern has been the possible effect of frequent marijuana use on the psychological, emotional, and social development of children and adolescents. In this area, firm research evidence is seriously lacking, and we are dependent on clinical impressions and individual case studies. Among clinicians who see children and adolescents who are frequent users, there is a growing consensus that such use seriously interferes with functioning and development. While it may be argued that clinicians are more likely to see those who are experiencing drug-related difficulties even though they may not be representative of users more generally, such evidence must be taken seriously. As with other drugs, it is likely that not all users are equally susceptible to drug-induced disruption of functioning. But it is those groups that are most likely to be adversely affected, children and early adolescents, who have not been systematically studied. Further, there are many individual case reports by older users indicating that their marijuana use, frequently coupled with other drug use, has been seriously disruptive of their lives. The question of whether it is marijuana use itself that is responsible or some combination of drugs and other lifestyle factors may be of only modest significance since we have good reason to believe that heavier users of marijuana are likely to be multiple-drug users whose lives increasingly revolve around their use. Undoubtedly, as previously noted, there are some heavy users who continue to function reasonably well despite their marijuana use, as is true of other types of drug use.

FUTURE DIRECTIONS

As this and other reviews so amply demonstrate, much remains to be learned about marijuana. Despite the street belief that different types of marijuana have different psychological and possibly different physical effects, the major defining property that has been studied in relation to human behavior has been dose as measured in terms of THC content. While other chemical constituents have been identified and studied to a limited extent, much less is known about the ways in which they may affect the user. In virtually all retrospective surveys, frequency of use has been the primary gauge of use intensity, with little regard to the actual quantities consumed, their varied potency, or the circumstances of use. Although marijuana is often used with other licit or illicit drugs, very little work has been done on possible interactive effects. The possibility that contaminants such as herbicides, bacteria, and fungi may play a role in marijuana's effects has been raised by recent reports, although again there has been little or no systematic investigation in these areas.

Studies of marijuana use have been largely limited to populations of adult males. Little attention has been paid to the possible effect of acute or chronic use on both younger and older users or, more specifically, on adolescent and adult females. Virtually no epidemiological research has been done to determine any statistical association between use and disease. Early studies of traditional cannabis users in other countries have not been followed up to determine just how much of the cannabis consumed actually plays a physiological role. Recently developed blood cannabinoid assays could readily assess the comparability of traditional use patterns and contemporary American use.

The deficiencies in the research literature to date suggest a number of approaches that would be useful in the future:

- Epidemiological research on patterns of marijuana use should be expanded to include better definitions of level of use based on measures in addition to frequency.

- Longitudinal studies of heavy users should begin at younger ages, and already existing longitudinal health studies should include marijuana and other drug use. Incidence of disease that might be related to a diminished immune response resulting from heavy use should be examined.

- In addition to heavy users, other populations that may be at high risk should be studied in connection with marijuana use. These would include the marginally fertile, offspring of women who used marijuana during pregnancy, prepubertal users, and persons who have medical or psychological conditions that may be affected by use (e.g., cardiac irregularities, hypertension, respiratory problems, or histories of serious psychological problems).

- Since much of the research on the acute effects of marijuana has been based on the use of low potency marijuana, replication of some of these studies using more potent materials may be needed.

- Studies of marijuana should include an examination of its effects on development and academic performance in younger users. Earlier studies based on moderate use by college populations may have little relevance to current use patterns by younger users.

- Animal studies suggesting that alterations in brain structure result from marijuana use should be replicated and extended to include the study of behavioral effects in both younger and older animals.

- Possible long-term cognitive deficits should be examined in populations of heavy users. The availability of standardized test results from testing done by school systems before the individual began drug use may provide a useful baseline against which to assess change. Since not all users are likely to be equally affected, populations of users reporting impaired functioning should also be carefully studied.

- Systematic study of drug use over extended periods of time may be useful in better determining the impact of use on functioning and in identifying factors that affect drug use transitions, including cessation of use.

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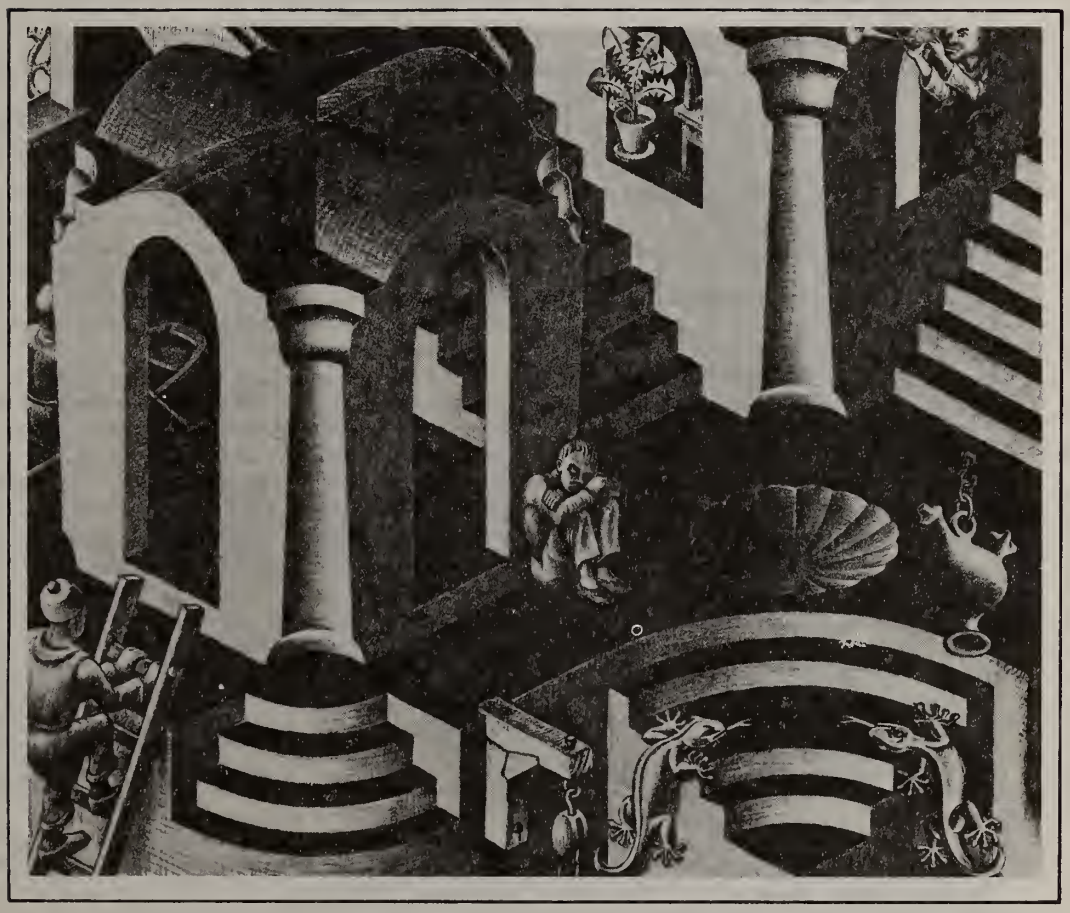
ABSTRACTS



O'Donnell, J.A., and Clayton, R.R. The steppingstone hypothesis. A reappraisal. Chemical Dependencies, in press.*

DRUG	Marijuana; heroin
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Literature review; theoretical/critical review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	29

PURPOSE

Many sociologists deny the stepping-stone hypothesis, which states that marijuana use somehow leads to heroin use. The definition of causality widely used by sociologists asserts that three criteria are necessary and sufficient to justify an assertion of causality: (1) the two variables are statistically associated; (2) one variable is temporally prior to the other variable; and (3) the association between the two variables does not disappear when the effects of other variables, prior to both of them, are removed. This paper argues that marijuana use is a cause of heroin use in the United States by employing this widely accepted sociological definition of causality. It presents data showing that the three criteria of causality under this conception are met: marijuana and heroin use are statistically associated, marijuana use precedes heroin use in most cases, and this association has not been shown to be spurious. The paper also examines the reasons for rejecting the causal connection and shows that often they are simply methodological errors.

*Copies of this article are available from Richard R. Clayton, Ph.D., Department of Sociology, University of Kentucky, Lexington, Kentucky 40506.

SUMMARY

Applying the definition of causality to marijuana and heroin use does not require the conclusion that marijuana is the only cause of heroin use and does not deal with the relative importance of marijuana use as a cause of heroin use. Nor does it imply that all marijuana users become heroin users, or that most heroin users have been prior users of marijuana, though the latter seems to be empirically true. The definition requires only that a larger proportion of marijuana users than of nonusers proceed to heroin use.

A nationwide probability sample of 2,510 men aged 20 to 30 years were interviewed in late 1974 and early 1975. Both marijuana and heroin were used by 147 men in the sample. Among these, 90 percent used marijuana first, 7 percent heroin first, and for 3 percent time order could not be determined. Of the 1,128 nonusers in the sample only 1 had used heroin. As marijuana use increased, the percentage of heroin users increased. This statistical association between marijuana use and heroin use is also supported by numerous other studies.

The third causality criterion always poses difficulties because all possible antecedent variables cannot be controlled. It has been argued, for example, that alcohol use and tobacco use precede both marijuana and heroin use and could also be stepping stones to heroin use. Data on relationships among alcohol, marijuana, and heroin use show that the relationship between marijuana and heroin is not spurious. To test the marijuana-heroin relationship for spuriousness, a random sample of 294 men born between 1944 and 1955 was taken. They lived in known high-drug-use areas in Manhattan when they registered for the draft. A linear relationship was found between marijuana and heroin, for which the percentages of use were 75 percent and 25.5 percent, respectively. Subjects were asked about such factors as drug availability, peer delinquency, school adjustment, and relationships with parents. Data confirmed that the marijuana-heroin relationship was not spurious, even when respondents came from areas where drug use and other forms of deviance were endemic.

Although this evidence presents a prima facie case for causality, denial of the evidence is so common that rejection of causality appears in elementary sociology texts without documentation. The arguments against causality are usually based on such methodological errors as assuming that the only relationship between marijuana use and heroin use is temporal, that causality is valid only if all marijuana users subsequently use heroin, or that measurable variables are not causes but are only indicators of other underlying causes. The most serious argument against the assertion of causality is that the relationship is spurious because subcultural variables, such as peer group marijuana use, are more relevant. This inference would be correct if the subcultural variables were prior to both forms of drug use. However, the data indicate that subcultural variables are prior to heroin but subsequent to marijuana use and are therefore intervening variables. Data indicate that marijuana use leads to selling marijuana, to selling hard drugs, to having heroin-using friends, and finally to heroin use. However, Johnson and Goode have used these findings erroneously to deny causality. In addition, it is unlikely that some new variable will be found that is prior to both forms of drug use because the relationship between marijuana use and heroin use is strong, and intervening variables exist between the two kinds of use. Denial of causality is partly a methodological problem and partly a political one, especially since the decriminalization of marijuana has become a political issue. Although arguments by law enforcement officials in the 1950s that marijuana use led to heroin were rightly rejected, the assertion that marijuana use made later heroin use more probable should not have been rejected.

CONCLUSIONS

The current process of decriminalization of marijuana is likely to produce an increase in its use. The effect of increased marijuana use on heroin use will depend on the mechanisms by which one has led to the other. Data indicate that one such intervening variable has been involvement in a drug subculture resulting from the need to enter the illicit market to buy marijuana. If this is the major intervening variable, an increase in marijuana use would lead to a prediction of increased heroin use because current decriminalization laws still leave the drug supply illegal. A policy that aims to minimize heroin use should therefore consider provisions for a legal supply of marijuana to break the connection between the two drugs. Such a policy should not be advocated now because a full understanding of how marijuana use leads to heroin use is still lacking. Recognition of the causal connection and an end to the current denial of it would make possible further research on the intervening variables and would show the relevance of the policy question that disappears with the denial of that connection.

Hendin, H.; Pollinger, A.; Ulman, R.B.; and Carr, A.C. The functions of marijuana abuse for adolescents. American Journal of Drug and Alcohol Abuse, 8(4):441-456, 1981-82.

DRUG	Marijuana
SAMPLE SIZE	17
SAMPLE TYPE	Heavy users
AGE	Adolescents (range: 14-18)
SEX	Both
ETHNICITY	White
GEOGRAPHICAL AREA	Northeast metropolitan area
METHODOLOGY	Representative case method; correlational study
DATA COLLECTION INSTRUMENT	Interviews; psychological test battery; longitudinal survey
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	35

PURPOSE

Research on adolescent marijuana use has devoted insufficient attention to the functions it has played in youngsters' overall adaptation, particularly in the context of family psychodynamics. Studies of college students who were heavy marijuana users showed that many used the drug to escape from competitive conflicts that were strongly tied to their family experiences.

To examine adolescent marijuana use from this perspective, the present study focused on 17 adolescents from middle-class and working-class families who were heavy marijuana abusers.

METHODOLOGY

Using the representative case method, 17 white youths between 14 and 18 years old living with intact families were selected from approximately 300 marijuana-abusing adolescents identified through the courts, schools, social agencies, mental health clinics, and private referrals within a northeast metropolitan area. The sample represented a variety of religious, occupational, and ethnic backgrounds, as well as both urban and suburban residences. Subjects included 11 males and 6 females.

All the adolescents and their families (the parents and a next age-order sibling in most cases) were seen over an initial period of 3 months, with followup visits at 6-month intervals over the next 2 years. Data were obtained through unstructured psychodynamic interviews and analyzed to identify the functions marijuana played for these youths. Each marijuana abuser and the abuser's sibling also completed a battery of psychological tests.

RESULTS

The study identified five key functions that marijuana played in the adolescents' psychosocial adaptation: defiance and provocation, self-destructiveness, control of anger, grandiosity, and escape from competitive conflicts. Almost all marijuana abusers either openly provoked their families with their drug use or defied their parents in other ways if their drug use was kept secret. This defiance was also evident in relationships with other authorities, particularly school personnel. Self-destructiveness was often a motivating factor in marijuana use. Several subjects were stoned to the degree of being nonfunctional for lengthy periods, and others combined marijuana and alcohol to drug themselves into unconsciousness. More importantly, marijuana also served to modify the youngsters' feelings of anger toward their families, which were often felt to be uncontrollable and which were part of a deeper, more disturbing feeling that they hated their parents. Adolescents continually talked about using marijuana to relax from the tension and anger at home caused by competition with siblings or parents' unrealistically high expectations.

The feelings of grandiosity produced by marijuana helped many adolescents alleviate their depression that stemmed from feeling that they amounted to nothing within their own families. Grandiose fantasies were particularly common among the young men, while the female abusers often expressed a feeling of invulnerability to any consequences of their behavior. These marijuana abusers generally had rejected competitive success long before they were interviewed. However, a connection between their drug use and competitive pressures rooted in the family was suggested by several youths' improved behavior, including less use of marijuana, that accompanied their own and their parents' acceptance of a need for a less pressured academic environment.

Case illustration. Dave at 17 was the oldest child of a suburban, middle-class Jewish family. As a young child, he was handsome, friendly, bright, and responsible. Friction with his mother began in early childhood when she criticized any accomplishments that did not fit the prescribed ways she wanted things done. Between the ages of 5 and 12, Dave became detached and was openly provocative by age 13. Provocation and retaliation involving the family car went back and forth between Dave and his mother repeatedly. Marijuana then became part of this struggle, with Dave growing plants secretly in the basement of his house. Although Dave did well academically until high school, he dropped out at the end of his junior year and later moved out of the house. Dave was hurt at feeling excluded from the family and by the awareness that his mother wanted him out of the house. His use of marijuana alleviated tension from anger toward his family. His inability to please his mother caused him to withdraw from competition and console himself with grandiose fantasies. Variations of this interrelationship were present in almost all the youngsters studied.

CONCLUSIONS

The patterns identified in this research support the conclusion that heavy marijuana use by adolescents is rooted in the psychodynamics of their families. Marijuana abuse did not produce a lack of ambition in these youths but rather expressed in illusory ways their desire for power, achievement, and control.

Abel, E.L. Marihuana and sex: A critical survey. Drug and Alcohol Dependence, 8:1-22, 1981.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Animals, humans
AGE	Not specified
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Literature review; theoretical/critical review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	120

PURPOSE

Contradictory assertions have been made throughout history regarding marijuana's effects on sexual activity and reproductive functions. The drug has been denounced for unleashing uncontrollable sexual passions and, at the same time, accused of diminishing libido and producing impotence. There is, however, no experimental evidence substantiating or refuting the drug's alleged effects on libido. Researchers have had to content themselves with studies of marijuana's effects on sex steroids and sperm.

This paper reviews animal and human studies of marijuana's effects on sexual behavior and reproductive physiology, including the one study of marijuana's effects on ovulation and sex steroids in women.

SUMMARY

Marijuana use is definitely associated with increased sexual activity among many individuals, but this appears to be a concomitant of a sensation-seeking lifestyle and not to have a causal relationship. The association between marijuana use and increased sexual activity may also depend on the frequency and amount of usage, with sexual activity decreasing as the amount and frequency

of marijuana use increases. Animal studies have also shown that marijuana inhibits male sexual behavior.

Marijuana use has no significant effect on the levels of testosterone in human males, but it does reduce the production of sperm. Animal studies have confirmed the adverse effects of cannabinoids on sperm production, although they have not revealed consistent changes in the weights of male sexual organs. No evidence exists that human marijuana users or male animals receiving cannabinoid compounds have reduced fertility or a greater risk of dominant lethal mutations.

Cannabinoid compounds inhibit ovulation in animals, and these compounds are also associated with depressed levels of luteinizing hormones (LHs) in both male and female animals. These lower LH levels appear to result from both hypothalamic and ovarian sites of action of the compounds.

It has been found that female marijuana users have shorter menstrual cycles and lower serum prolactin levels than nonusers. Animal studies have shown that cannabinoid compounds are associated with lower prolactin and follicle-stimulating hormone levels in females. The effects of cannabinoids on progesterone levels have not been conclusively determined. Other studies fail to support the contention that cannabinoids possess estrogenic activity.

CONCLUSIONS

Although marijuana use is associated with increased sexual activity, marijuana use and level of sexual activity are not necessarily causally linked. Rather, the association appears to be linked to a lifestyle that includes sensation seeking. The association between marijuana use and increased sexual activity may be dose and frequency related. The author surmises from anecdotal information that as amount and frequency increase, sexual activity decreases. Marijuana does adversely affect sperm production, but these changes have no biological significance, there being no evidence of dominant lethal mutations, etc.

Nearly all of the adverse effects of cannabinoid exposure on animals' reproductive organs can be attributed to the secondary effects resulting from weight loss associated with drug-induced decreases in food and water consumption. The female reproductive system is known to be especially susceptible to weight loss. Effects on male animals are more variable. The author attributes the isolated report of gynecomastia in three marijuana users to undernutrition.

The possibility that drugs will adversely affect reproductive function by reducing food and water consumption has been known for some time. Future experimental studies with animals should use pair-feeding techniques in order to assess the role of drug-induced weight loss. Unless these controls are included, it is difficult to separate direct pharmacological effects from secondary effects and to arrive at definite conclusions.

Braff, D.L.; Silverton, L.; Saccuzzo, D.P.; and Janowsky, D.S. Impaired speed of visual information processing in marijuana intoxication. American Journal of Psychiatry, 138(5): 613-617, 1981.

DRUG	Marijuana
SAMPLE SIZE	10
SAMPLE TYPE	Occasional to moderate users
AGE	Young adults (mean ± SD: 25.7 ± 2.8)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Intoxication scale; stimulus detection test (Gerbrand tachistoscope); self-reports
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	24

PURPOSE

Investigators interested in the effects of marijuana on perception and memory have tried to discriminate its impact on initial, labile sensory memory from its effects on relatively permanent short-term memory. Verbal recall tasks have been used to examine marijuana's effects on early information processing, but the stages involved in such processing move so quickly from the sensory into the permanent short-term memory that conclusions from these experiments have been suspect.

In an alternative approach, this study attempts to identify marijuana's effects on iconic memory and the speed of information processing using a backward masking paradigm. The results are interpreted in the context of established theories on the existence of a brief, time-dependent sensory memory articulated by Sperling, Averbach and Coriell, and Neisser.

METHODOLOGY

The subjects were 10 male volunteers identified as occasional to moderate marijuana users. All had completed college and were in their mid-twenties. Volunteers were tested on two occasions, approximately 1 week apart, and asked to abstain from smoking marijuana for at least 2 days

before the tests. Half the subjects received a marijuana cigarette containing 6 mg of THC on the first day of testing, and half received a placebo. The order was reversed on the second day in double-blind fashion. Subjects were allowed 5 minutes to smoke and 10 minutes between the smoking and testing. At this point, they rated themselves on an intoxication scale, and their heart rates were measured.

Subjects were then tested on how quickly they could identify (using a Gerbrand four-field tachistoscope) the letters "T" or "A" flashed before them in a darkened room. After practice sessions, the target stimulus was flashed before subjects at 1 msec duration. Its duration was increased until the subject reached seven consecutive correct identifications, defined as the critical stimulus duration.

To test whether the stimulus could be erased from memory by a powerful masking stimulus (backward masking), the experiment then flashed a double X mask lasting 50 msec after each stimulus, along with a no-mask control condition. The entire procedure lasted 20 minutes at most.

RESULTS

Analysis of the subjective ratings and heart rate measurements confirmed that subjects were intoxicated. Analysis of subjects' critical stimulus duration did not reveal any statistically significant differences between subjects smoking marijuana and those smoking placebos. However, marijuana intoxication did impair performance on the masking tests, which reflect the speed of processing. Posthoc Newman-Kuels comparisons revealed no specific points of significant differences, reinforcing the idea that the marijuana condition induces a generalized rather than a focal slowness of process.

CONCLUSIONS

The lack of critical stimulus duration differences between the experimental groups contradicts some common lore about marijuana intoxication, such as the idea that the drug lowers the sensory threshold and heightens visual sensitivity. The masking data indicate that marijuana slows the speed of processing from labile iconic memory to more permanent registration and processing. These results contradict previous studies hypothesizing that marijuana changes the initial sensory threshold, as well as those contending that the drug has no impact on the processes of longer term memory operations.

Marijuana-induced slowness of processing may overload the iconic memory so that multiple icons exist simultaneously in the iconic bin. This would lead to disrupted information processing because incoming stimuli would fuse with those stuck in the iconic bin. To achieve better understanding of the cognitive dysfunction induced by marijuana, future research should use higher doses of THC and other active placebo drugs, as well as combine the backward masking paradigm with other dependent variables.

Brook, J.S.; Whiteman, M.; and Gordon, A.S. The role of the father in his son's marijuana use. Journal of Genetic Psychology, 138:81-86, 1981.

DRUG	Marijuana
SAMPLE SIZE	71
SAMPLE TYPE	Adolescent volunteers
AGE	16 to 20 years
SEX	Male
ETHNICITY	White; British West Indian; black
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Interviews
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	8

PURPOSE

Although much research has focused on the mother's impact on the adolescent's development, the father's contribution to his child's development has been largely neglected. This study explored several perceived paternal dimensions and their association with the son's marijuana use. The study focused on warmth versus hostility and control versus autonomy, as these dimensions have both been found to be related to the adolescent's behavior. The study also examined paternal dimensions both alone and in interaction with other aspects of the family system, especially the mother-son relationship. The study controlled for maternal variables.

METHODOLOGY

Subjects were 71 male adolescents from intact homes who were between the ages of 16 and 20. A total of 30 subjects were white; 24, British West Indian; and 17, black. Subjects lived in contiguous inner city neighborhoods and most attended public school. The three ethnic groups had approximately equal socioeconomic status. Each subject was interviewed at home by a trained staff member of the National Opinion Research Center of the University of Chicago. The

structured interview schedule focused on the adolescent's perception of freedom allowed by each parent, of the parents' degrees of child-centeredness, of the extent to which the parents used guilt-evoking methods of discipline, of how much the adolescent was loved by each, and of the extent to which the adolescent identified with each parent. The dependent variable was the frequency of marijuana use; 59 percent of the adolescents reported using marijuana. Pearson product-moment correlations between the paternal and maternal variables and the sons' use of marijuana were obtained. A stepwise multiple regression analysis was used with two sets of variables: (1) ethnicity, socioeconomic status, and maternal scales and (2) the five paternal scales.

RESULTS

The maternal variables were not found to be significantly related to the sons' use of marijuana. Two paternal variables, child-centeredness and warmth, were significantly related to adolescent marijuana use; nonusers were more likely than users to report having fathers who centered their attention on them and also perceived their fathers as showing more warmth than did users. Also, nonusers were more likely to have warm mothers and fathers who did not use control through guilt as a disciplinary method. Marijuana users had mothers who were not child-centered and fathers who did not grant their sons sufficient autonomy. The father domain was significantly related to adolescent marijuana use with control on ethnicity, socioeconomic status, and the maternal domain.

CONCLUSIONS

Findings indicated that paternal factors related both separately and together with maternal variables to the adolescent male's use of marijuana. The degree of paternal affection was related to the son's use of marijuana. Boys who received insufficient warmth and whose fathers were not child centered were more likely to use marijuana than were boys whose fathers were warm and child centered. Boys with fathers having these qualities may react more realistically and adaptively to frustrating situations and therefore will not turn to drugs to cope with frustration, or they may be more receptive to reward and punishment if their fathers are warm and child centered. Conclusions are consistent with other findings of the influence of paternal warmth and child-centeredness on the adolescents' behavior, personality, and attitudes. Findings also showed that paternal control, unlike paternal affection, interacts with maternal affection in relation to drug use. Absence of both maternal affection and paternal tolerance in control and authority relates to increased marijuana use. Thus, youths lacking a warm and tolerant environment may use drugs as a means of escape or may express hostility toward themselves in drug-taking behavior. Findings regarding control support Lamb's belief that the father's behavior must be examined in the context of the entire family. Different causal interpretations for the study's findings are possible. They could mean that paternal characteristics are the antecedents of adolescent marijuana use or that the adolescent's use of marijuana may have led to changes in paternal dimensions involving affection and control. The former view is more tenable, especially in view of Hoffman's work maintaining that the power relationships involved make the direction of influence in the parent-child relationship more likely to be from parent to child than from child to parent.

Cohen, S. Adverse effects of marijuana: Selected issues. Annals of the New York Academy of Sciences, 362:119-124, 1981.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Theoretical/critical review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	15

PURPOSE

Concern about the physical and psychological effects of marijuana smoking is part of the broader concern about the impact of environmental factors on human health. Three aspects of marijuana use are particularly disquieting: the continuing trend toward chronic use; the inhalation of smoke products; and the practice of frequent intermittent intoxications, particularly among pre-adolescents and adolescents.

This paper reviews research and clinical impressions on the relationship of marijuana use to two areas: pulmonary pathology and residual psychological effects.

SUMMARY

Chronic pulmonary issues. Although Hoffman and colleagues concluded that tobacco and marijuana smoke are similar in their content of carcinogens, cocarcinogens, and cilia toxic agents, marijuana actually contains 50 percent more carcinogenic polyaromatic hydrocarbons (PAHs), including benzo(a)pyrene. In addition, Novotny found in marijuana smoke a number of higher molecular weight PAHs not detectable in tobacco smoke. Moreover, like tobacco, marijuana smoke induces aryl hydrocarbon hydroxylase, the enzyme that converts PAHs into their ultimate carcinogenic form.

Application of marijuana smoke condensates to mouse skin, a standard assay for carcinogenicity of tobacco tar, has produced metaplasia of the sebaceous glands and tumors. Marijuana smoke has also resulted in inhibition of DNA synthesis and atypical cell proliferation progressing to malignant transformation in studies involving human and animal lung explants. Both the marijuana and tobacco smoke acted as carcinoma accelerators, not initiators, and the marijuana smoke was more effective than tobacco smoke in producing the malignant cells.

Some animal studies have also shown that equivalent amounts of marijuana and tobacco produced bronchiolitis suggestive of early emphysema. American soldiers who consumed large amounts of hashish in Europe reported bronchitis, asthma, and rhinopharyngitis. However, studies of chronic cannabis users in Costa Rica, Jamaica, and Greece did not confirm this decrement in pulmonary function.

Experimental studies in the United States have generally indicated early constrictive pulmonary disease in marijuana and marijuana-tobacco users. Another problem associated with both tobacco and marijuana smoke is impairment of pulmonary alveolar macrophage activity. Moreover, the combined use of marijuana and tobacco produces additive effects on the pulmonary system.

Residual mental effects. Juvenile users of marijuana who become chronic users face particular risks in this area because they have a longer life span to develop adverse mental symptoms and because their developing brains may be more sensitive to cannabis than the adult brain.

The main risk is the amotivational syndrome, which involves mental dulling, emotional blunting, and loss of drive and goal-directedness. THC is a central nervous system depressant, and chronic daytime intoxication with any sedative is demotivating. The persistence of the syndrome for weeks to years cannot be explained solely by the long retention time of THC in lipids like brain tissue. Chronic brain syndrome may be postulated, though the current literature does not provide definitive answers on this issue.

CONCLUSIONS

Long-term marijuana use probably results in inflammatory or neoplastic changes in the lungs, especially where the person uses both tobacco and cannabis. Although definitive studies are needed, clinical impressions indicate that some marijuana users, especially young users, can sustain temporary and possibly permanent impairment of their usual mental performance.

Council on Scientific Affairs, American Medical Association. Marijuana: Its health hazards and therapeutic potentials. Journal of the American Medical Association, 246(16):1823-1827, 1981.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	44

PURPOSE

While therapeutic possibilities are emerging for cannabis and its constituents, new evidence also indicates that marijuana is hazardous to health. Occasional ingestion of marijuana by healthy individuals may not always constitute a health or social problem, but the potential for damage is great for persons at high risk, such as children, adolescents, and the mentally ill.

This report discusses surveys on marijuana use by young persons, health problems resulting from marijuana use, legal penalties, and therapeutic potentials of the drug.

SUMMARY

Use of marijuana among youths. A nationwide survey by the National Institute on Drug Abuse reflected significant changes in marijuana use from 1971 to 1979. The usage rate for adolescents aged 14 and 15 years tripled, climbing to 32 percent, while that for 16- and 17-year-olds rose from 27 percent to 51 percent. The survey found that in 1979 only 8 percent of 12- and 13-year-olds had ever tried marijuana, but this is one-third larger than the 1971 figure. Most deleterious effects are related to long-term use and to the quality of marijuana. In this context, cannabis preparations used today are at least five times more potent in THC than those available 5 years ago.

Health hazards. Bronchial and pulmonary irritations from marijuana use have been well documented. Although short-term administration has reduced bronchial spasms induced experimentally in asthma sufferers, long-term use has impaired lung functions in otherwise healthy subjects.

Marijuana has up to 50 percent more polyaromatic hydrocarbons in its smoke than does tobacco. Differences between tobacco and marijuana smoke are particularly significant because marijuana typically is smoked down to a miniscule butt, and the smoke is retained for a longer time in the lungs. One study revealed that smoking less than 1 marijuana cigarette per day diminished the lungs' vital capacity as much as smoking 16 cigarettes.

Marijuana does not produce significant electrocardiogram changes in healthy young adults. However, as tachycardia is a regularly observed consequence of marijuana use, and as smoking even one marijuana cigarette can significantly reduce exercise tolerance in heart patients with anginal syndrome, the evidence suggests that persons with cardiac disorders should not use marijuana.

Conclusive proof of macroscopic brain damage from marijuana is lacking, but damage does not have to be visible to result in impaired mental functioning. There are many anecdotal reports on the lack of academic drive in heavy marijuana users, and experimental studies have shown adverse short-term effects of marijuana use on cognition and immediate memory.

Research using simulated and actual traffic conditions has confirmed that marijuana adversely affects the ability to operate a motor vehicle. Acceptable limits for marijuana intake have not been identified because of the uneven quality of marijuana being used and its differing effects on individuals. Problems involving reaction time, cognition, and coordination are markedly amplified when alcohol and marijuana use are combined.

A growing body of data from human and animal studies suggests that marijuana use diminishes fertility and endangers the fetus. There is conflicting evidence regarding the lowering of testosterone levels in males, but long-term marijuana use may cause abnormal menstruation and fetal damage in females.

Marijuana could play a role in cell alterations and chromosome breakage, even though studies in this area have failed to isolate marijuana use as a causal factor from other drug taking and ways of living. Another controversial subject is marijuana's impact on the immune system; one animal study has shown a definite correlation between marijuana smoking and impaired immune response.

It has been known for some time that children and adolescents are at high risk psychologically when they use psychoactive substances, but recent studies have proved that persons with schizophrenia or other major mental disorders also place themselves in jeopardy by using marijuana. The etiology of the drug's toxic effects remains unclear.

Implications of research. Because marijuana is a dangerous drug, trafficking in the substance should be subject to stringent penalties and vigorous prosecution. Legislation designed to moderate penalties for possession of small amounts of the drug should still discourage use and not support misconceptions that marijuana is harmless. Fines large enough to deter use could be substituted for prison penalties.

Therapeutic potentials. Well-designed studies have demonstrated the superiority of THC over placebos in treating extreme nausea for patients undergoing cancer chemotherapy. Evidence conflicts, however, on the comparative efficacy of THC and prochlorperazine, a standard antiemetic drug. Older patients seem to respond less well than younger ones to marijuana and complain more about unpleasant drug-induced effects.

Other possible uses for THC and marijuana are reducing intraocular pressure in glaucoma and treating muscle spasticity. Medical use of marijuana and THC is now authorized in more than 20 States. States with enabling legislation not yet implemented should establish appropriate regulations, and States considering future laws should follow guidelines established by the Food and Drug Administration.

CONCLUSIONS

The medical profession and scientific community must continue to evaluate all research on marijuana and assume a leading role in educating citizens on the facts and their implications.

Moreover, the practicing physician should continue to be concerned with treatment programs as well as prevention.

Creason, C.R., and Goldman, M. Varying levels of marijuana use by adolescents and the amotivational syndrome. Psychological Reports, 48:447-454, 1981.

DRUG	Marijuana
SAMPLE SIZE	55
SAMPLE TYPE	Nonusers, casual users, heavy users, ex-users
AGE	Adolescents; young adults (range: 15-18)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Kansas City, Missouri
METHODOLOGY	Comparative study; correlational study
DATA COLLECTION INSTRUMENT	Questionnaires; anagram test
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	21

PURPOSE

According to the amotivational syndrome hypothesis, marijuana use lowers the user's activity level and will to achieve. The clinical studies that dominate the literature on marijuana have consistently reported this syndrome, but the experimental studies have produced equivocal results.

The present study analyzes the effect of various levels of marijuana use on motivation. It differs from previous research in that it uses adolescents rather than adults as subjects and an objective dependent variable to indicate motivation instead of relying on surveys and self-reports.

METHODOLOGY

Subjects were 55 adolescents aged 15 to 18, of whom 43 were enrolled in a high school in Kansas City, Missouri. Twelve were completing the last month of a 6-month drug rehabilitation program. These 12 subjects had been free from marijuana for 5 months, as verified by urinalyses conducted by the program. About half of the subjects were boys.

The subjects first completed a questionnaire that included an item on the frequency of marijuana use in the previous month. From the responses, subjects were classified into three groups. Nonusers were those reporting no use during the previous month; casual users reported use once or twice a week or less; and heavy users were those reporting marijuana use three or more times a week. The 12 subjects in the rehabilitation program were classified as ex-users. The total sample included 19 nonusers, 13 casual users, 11 heavy users, and 12 ex-users.

All subjects were asked to unscramble the letters in a set of single-solution anagrams in a 3-minute period. After 3 minutes, the subjects were given a second set of anagrams and told that the person who improved the most from the performance on the first exercise would receive $5. The dependent variable in the analysis was the difference in the number of correct solutions between the first and second trials. The experiment assumed that the first trial measured raw ability to solve anagrams, the second measured the ability to solve anagrams when motivated, and the difference was the motivation of each subject.

RESULTS

Analysis of variance showed that the differences in initial performance between the groups on the first trial were well within chance occurrences. However, the mean difference scores for the four categories of subjects showed significant differences. Nonusers did not differ significantly from casual users, and heavy users did not differ significantly from ex-users. However, heavy users and ex-users were significantly lower on the motivation measure than casual users and nonusers.

CONCLUSIONS

Drug use appears to be an important factor affecting motivation. However, the fact that ex-users were indistinguishable from heavy users indicates that the actual immediate presence of the drug is unimportant. Moreover, casual users' similarity to nonusers' implies that moderate use may be unimportant to motivation.

Three possible explanations of the mechanism involved in these motivational differences are that heavy drug use causes some chronic brain syndrome producing low levels of motivation on certain types of tasks, that low motivation causes drug use, or that some other factor causes both drug use and low motivation. However, the similarities between nonusers and casual users and between heavy users and ex-users raises doubts about the possibility that marijuana causes some chronic brain syndrome affecting motivation. The most likely explanation for the study's results is that a third factor, such as boredom or peer-group association, produces both an increased likelihood of heavy marijuana use and lowered motivation.

Jones, R.T.; Benowitz, N.L., and Herning, R.I. Clinical relevance of cannabis tolerance and dependence. Journal of Clinical Pharmacology, 21:143S-152S, 1981.

DRUG	Cannabis
SAMPLE SIZE	120
SAMPLE TYPE	Experienced marijuana users
AGE	Not specified
SEX	Males
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Descriptive study; secondary analysis
DATA COLLECTION INSTRUMENT	Laboratory reports; nursing staff observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	29

PURPOSE

Virtually every psychoactive drug produces measurable tolerance on some indices of drug effects, although tolerance does not develop to all effects at the same rate. To examine the significance of cannabis tolerance, this paper reviews published studies and unpublished laboratory data. In the present discussion, "tolerance" means a diminished drug effect following repeated doses and a return of effect if dose is increased. "Dependence" refers to the appearance of fairly predictable signs and symptoms when drug administration is stopped. The mechanisms of tolerance and dependence are intimately related for many psychoactive drugs, but these substances are often widely used therapeutically before the implications of this relationship are fully appreciated.

METHODOLOGY

Cannabis was evaluated with the same laboratory conditions as were necessary to experimentally demonstrate tolerance and dependence involving opiates and sedative hypnotic drugs. The subjects were 120 male volunteers who were experienced marijuana users. They lived on a hospital research ward for 2- to 6-week periods during the experiment. A 3- to 7-day placebo treatment period after admission was followed by a 5- to 21-day period when 10 to 30 mg oral doses of

cannabis extract or THC were given every 3 to 4 hours. After this sustained intoxication phase, subjects were abruptly switched back to placebo medication for 4 to 8 days.

RESULTS

Tolerance to many drug effects, such as cardiovascular changes and decreased intraocular pressure, was measurable after only a few days on the 10 mg dose. Increasing a single dose by 30 to 50 percent would usually produce a prompt and temporary return in symptoms. Additional experiments giving periodic doses of smoked or intravenous THC during the course of oral THC administration indicated that the mechanisms of tolerance in humans are probably more related to adaptation at sites of drug action than to changes in drug metabolism.

Changes in behavior were characterized by irritability, restlessness, insomnia, anorexia, nausea, sweating, salivation, increased body temperature, altered sleep and waking EEG, tremor, and weight loss. The intensity of most symptoms was greatest at about 8 to 12 hours after stopping THC, but most were diminished 24 hours after and not measurable after 3 to 5 days. At least 5 days of steady intoxication seemed necessary to produce a minimal withdrawal syndrome. Withdrawal symptoms did not appear in two subjects given 10 mg of THC every 3 hours for 10 days. As with many drugs, the more frequent and greater the dose, the more intense the withdrawal.

CONCLUSIONS

The pattern of cannabis tolerance suggests that many unpleasant side effects, such as hypotension and mental confusion, can be minimized by starting off on a low dose and gradually increasing it over a few days. However, the data also suggest that the initial drops in intraocular pressure and initial brain wave alterations may disappear very rapidly with continued drug administration, compromising cannabis's therapeutic efficacy. In summary, it appears that cannabis follows similar principles and rules as most other psychoactive drugs. It would be advantageous to consider potential problems posed by tolerance or dependence prior to the introduction of cannabislike therapeutic drugs now, rather than in 20 to 30 years.

Kaymakcalan, S. The addictive potential of cannabis. Bulletin on Narcotics, 33(2):21-31, 1981.

DRUG	Cannabis
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Cross-cultural
GEOGRAPHICAL AREA	International
METHODOLOGY	Literature review; theoretical/critical review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	49

PURPOSE

Cannabis as a psychoactive drug has been used for many centuries, but its addictive potential has been recognized only recently. The identification and synthesis of THC as the main active substance of cannabis, as well as the explosive increase in cannabis use, have stimulated research in many countries. This paper reviews case studies and experiments on tolerance to and dependence on cannabis in humans and laboratory animals, with particular attention to research conducted after 1970.

SUMMARY

Tolerance. For a long time researchers felt that cannabis did not produce tolerance and interpreted the longer lasting effects reported by experienced marijuana smokers compared to naive subjects as reverse tolerance. However, recent evidence supports the view that tolerance develops to the many effects of cannabis in both laboratory animals and humans.

Psychological dependence. Several animal studies have demonstrated psychological dependence, the compulsive need to take a substance or an intense craving for it. Psychological dependence is the basis of cannabis abuse, and is demonstrated in animals by continued self-administration

after a period of withdrawal. Experiments by Deneau and Kaymakcalan and by Pickens and others have succeeded in producing self-administration of THC in monkeys. Others have produced self-administration in rats, although the percentage who self-administered THC was low, compared to rats that self-administered amphetamines and narcotics.

Physical dependence in laboratory animals. The most conclusive evidence on the animals' physical dependence has come from studies of rats and monkeys. Several investigators have observed withdrawal changes in monkeys, such as increased aggressiveness, hallucinations, and EEG changes. Recent studies indicate that the abstinence syndrome of THC-treated rats consists of many signs and symptoms. Some documented withdrawal symptoms are increased activity, changes in electrocorticograms, and an increase in grooming. Hirschorn and Rosecrans reported in 1977 that naloxone[1] precipitated a narcoticlike withdrawal syndrome in rats treated for 5 weeks with increasing doses of THC. Another study confirmed these findings and showed that abrupt withdrawal of cannabis injections can produce an opiatelike abstinence syndrome. The most common signs of abstinence in THC-treated rats were ptosis, teeth chattering, piloerection, defecation, urination, complete palpebral closure, dyspnea, and increased grooming. Taylor and Fenessey reported in 1978 a chlorimipramine-induced withdrawal syndrome in THC-treated rats; these experimenters have referred to "a state of physical dependence" produced by THC.

Physical dependence in humans. Many publications describing cannabis withdrawal symptoms in humans refer to countries in which potent forms of cannabis are available. However, reports on soldiers admitted to military hospitals in the United States in the 1940s detailed marijuana withdrawal symptoms. Recent studies from India have confirmed the dependence liability of cannabis. One such project sponsored by the World Health Organization in 1976 found that as many as 70 percent of the cannabis users reported some kind of physical discomfort in the absence of the drug. Observers of young chronic hashish smokers who came to Switzerland from the Middle East concluded that cannabis carried a dependence risk. Dependence has also been reported in South Africa.

Faced with the current epidemic of marijuana use among young persons, psychiatrists and physicians have begun observing withdrawal symptoms in heavy marijuana users. Experiments using cannabinoids on volunteers have yielded similar reports. Investigators interested in the withdrawal changes in sleep patterns and the EEG of volunteers after THC administration also concluded that marijuana caused physical dependence.

The work of Jones and others is the most convincing proof of marijuana's ability to produce physical dependence. Volunteers were given fixed oral doses of 180 to 210 mg THC per day for 11 to 21 days and then abruptly switched to placebo for 5 to 9 days. All exhibited a variety of abstinence signs and symptoms.

There is little doubt that a cannabis withdrawal symdrome exists, confirming the possibility of physical human dependence. Common abstinence symptoms observed in humans are excitation, irritability, agitation, restlessness, tremors, anxiety, depression, insomnia, sweating, abdominal distress, nausea, anorexia, general malaise, and muscular aches.

CONCLUSIONS

The characteristics of cannabis tolerance are similar to those of opiate dependence. There are similarities in the initiation, degree, and duration of tolerance and in withdrawal symptoms. The addictive potential of cannabis is often compared to that of alcohol and tobacco. However, active cannabinoids remain in the tissues for a long time, in contrast to alcohol and nicotine, which are easily destroyed and eliminated from the body. Moreover, the spectrum of pharmacological effects of cannabis is so large that the effects of this substance cannot be compared with the effects of the other two substances.

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[1] Naloxone is a narcotic antagonist--ED.

Lamanna, M. Marijuana: Implications of use by young people. Journal of Drug Education, 11(4): 281-310, 1981.

DRUG	Marijuana
SAMPLE SIZE	2,222
SAMPLE TYPE	2,172 college and high school students; 30 clients of drug rehabilitation centers; 20 white-collar workers
AGE	Adolescents; young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Albany, New York, area
METHODOLOGY	Descriptive study
DATA COLLECTION INSTRUMENT	Interviews; questionnaires
DATE(S) CONDUCTED	1981
NO. OF REFERENCES	75

PURPOSE

Many people refer vaguely to a "marijuana problem" and suggest that the drug impairs youths' development, learning, and schooling. This study used survey and interview data as well as results from recent literature to explore seven specific concerns: (1) that marijuana is being used too often and at too early an age; (2) that marijuana is used for negative reasons and without effective rules for its use; (3) that marijuana's psychoactive effects lead to irrational or unsafe behavior; (4) that young people lack accurate information about the drug's effects on the body; (5) that the use of marijuana leads to dependence and the use of other drugs; (6) that marijuana use impairs the ability to learn; and (7) that marijuana use contributes to school problems, including absenteeism, tardiness, drug trafficking, and other negative behavior.

METHODOLOGY

In 1981, the study surveyed 2,172 college and secondary school students from 11 schools within 80 miles of Albany, New York. The secondary schools were located in rural, small city, highly urban, and suburban areas. A total of 150 students were interviewed directly to check the survey responses and gather anecdotal information. In addition, 30 clients at drug rehabilitation centers and 20 successful white-collar workers of similar age and use patterns were interviewed. Information from published studies and a similar survey done in 1979 are also cited.

RESULTS

Respondents reported increasing involvement in marijuana use by youths at earlier ages. They viewed marijuana as an appropriate drug of choice if used moderately and at the proper age. Use levels appear to have peaked over the past 2 years and to have remained stable at a rather high level of use, but the age of entry into use has steadily declined. Pleasure, modeling by other students, and access promoted that use.

Respondents generally agreed that rules governing marijuana use are important. Many young people appeared to use guidelines for involvement with marijuana. However, many teenagers did not have conscious control over how they use the drug. Those who operate without rules and who tend to be heavily involved in drug use show behavioral and attitudinal patterns similar to the problem drinker.

Most users viewed marijuana as a relatively safe substance in terms of its psychoactive effect, although they did not necessarily see the marijuana "high" or its long-term effects as benign. Studies have shown the overall effects of marijuana at low dose levels to be rather mild and safe in comparison to other psychoactive drugs, although risks exist.

Marijuana users tend to be aware of the drug's general effects on the body and to believe that marijuana may impair health. Concerns about toxicity, teratogenicity, effects on virility in males, cerebral damage, and deterioration of pulmonary function are among these concerns. Many users are also generally aware of possible health problems that could be associated with the combined use of marijuana and other drugs, such as alcohol.

While marijuana does produce some degree of tolerance and mild withdrawal symptoms, evidence suggests that its addictive potential probably relates more to personal or psychological factors than to pharmacological ones. While abstainers in this study generally believed that marijuana use leads to the use of other drugs, frequent users tended to disagree. Subjects from the therapeutic communities who had smoked chronically in the past felt strongly that marijuana use eased access to other drugs as well as to a peer setting more conducive to polydrug use, but most users disagreed with the concept of a direct stepping-stone effect.

Respondents generally agreed that marijuana impairs learning, although frequent users felt that after a period of use the user learned to adjust to the psychoactive effect and developed cues to lessen intoxication. New and more complex learning was affected more strongly than repeated tasks. The literature documents such impairments as free-recall deficits and short-term memory reduction and notes that these impairments are not reversed by altering motivational states. Anecdotal responses also indicated that marijuana use had negative effects on motivation, although the literature does not support the concept of the amotivational syndrome. Assertions that marijuana use improves sound perception and visual effectiveness are not supported in the literature.

Marijuana use tends to foster grouping and related difficulties among students when in school. In addition, schools have become convenient markets for marijuana peddlers. Most of those interviewed felt that marijuana marketing encouraged the sale of other illicit drugs. Marijuana use also created instruction problems and led, in a few subjects, to general social deviance. Most study respondents believed that users and not the drug are responsible for their own negative attitudes, lack of involvement, poor motivation, violence, or vandalism.

CONCLUSIONS

Since marijuana will continue to be a main drug of choice among youths, drug educators need to provide accurate information to help young people make consciously responsible choices related to the use of the substance. Periodic reviews of the scientific literature and surveys of use patterns among young people are recommended. All faculty members should deliver accurate information on marijuana and its relationship to health, learning, and behavior in order to foster more judicious choices.

McBay, A.J., and Owens, S.M. Marijuana and driving. In: Harris, L.S., ed. Problems of Drug Dependence, 1980, National Institute on Drug Abuse. Washington, D.C.: Supt. of Docs., U.S. Govt. Print. Off., 1981. Pp. 257-263.

DRUG	Marijuana; alcohol
SAMPLE SIZE	100
SAMPLE TYPE	Drivers killed in single-vehicle crashes
AGE	Not specified
SEX	Not specified
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Descriptive study
DATA COLLECTION INSTRUMENT	Iodine-125 tracer (radioimmunoassay)
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	9

PURPOSE

While alcohol will probably continue to be the drug that most frequently causes the deterioration of driving performance, the contribution of other drugs, alone and in combination with alcohol should be ascertained. The effects of drugs on driving may best be determined by analyzing the concentration of drugs in the blood of a significant number of operators involved in crashes not attributable to other causes.

The sparse and somewhat questionable research on marijuana's impact on driving skills does not show that marijuana is a factor in unsafe driving. It does suggest that if there are drivers who are unsafe because of marijuana consumption, their numbers are small and most are also influenced by alcohol. This study analyzes blood samples from operators killed in single-vehicle crashes to determine THC content sufficient to influence driving ability.

METHODOLOGY

The blood specimens of 100 dead vehicle operators were analyzed for THC by radioimmunoassay using an iodine-125 tracer. The analysis was tested further by analyzing specimens obtained from controlled smoking experiments.

RESULTS

THC was found in the the blood of 9 of the 100 cases, and alcohol in sufficient concentration to influence driving was found in 6 of the 9 specimens. No opiates, amphetamines, or phencyclidine were found in any victim. Marijuana might have added to the effects of alcohol in 6 of the 100 cases. Marijuana alone might have been a factor in 3 of 100. The incidence of alcohol in concentration greater than 0.09 percent was 62 percent (62 of 100). The number of drivers who had marijuana in their blood was very small compared to the number of those who had alcohol in their blood.

Smoking studies reveal that the concentration of THC peaks in the blood at about 50 to 150 micrograms/L, depending on the dose, in minutes while still smoking. The concentration drops to half that amount in about 10 minutes and to less than 10 micrograms/L in about an hour. The concentration of THC found in the victims in this study ranged from 3 to 18 micrograms/L, with a median of 5 micrograms/L. The authors are unable to assess the effects of these concentrations on driving.

CONCLUSIONS

The safety of driving after smoking marijuana will have to be established. The authors do not think that this has been done. No reports were found indicating that during the time of the high, driving performance was affected. This study failed to prove that marijuana affects driving safety. It will be difficult to determine if the drug is a significant factor in traffic safety because its effects are subtle and no instruments like alcohol breath testing equipment exist for the detection and quantitation of marijuana. Furthermore, legal and logistic problems make it difficult to obtain blood specimens from the general driving population to evaluate nonaccident drivers who smoke marijuana. The most meaningful answers concerning the effect of marijuana on driving will probably come from further study of the blood of operators killed in single-vehicle crashes.

Miranne, A.C. Marijuana use and alienation: A multivariate analysis. The International Journal of the Addictions, 16(4):697-707, 1981.

DRUG	Marijuana
SAMPLE SIZE	766
SAMPLE TYPE	University students
AGE	Adolescents; young adults (range for most: 18-23)
SEX	Both
ETHNICITY	Mainly white
GEOGRAPHICAL AREA	Southwestern United States
METHODOLOGY	Multivariate analysis; correlational study
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Fall 1975
NO. OF REFERENCES	22

PURPOSE

Empirical studies have produced conflicting results regarding the relationship between alienation and marijuana use. Conflicting results are not explained by method of data collection, type of sample, or study dates. However, the type of analysis used may be a source of the discrepancies in the literature. Although many studies have examined the relationship between alienation and marijuana use, few have used a multivariate design to control for other factors.

This study explores the relationship between marijuana use and various indicators of alienation using a multivariate design. The study controlled for such factors as sex, religious affiliation, religiosity, family structure, and parents' socioeconomic status, since these factors have been found to be significantly related to both marijuana use and alienation.

METHODOLOGY

In 1975, questionnaires were administered to introductory sociology students at a large southwestern university located in a metropolitan area. The university was chosen because of its size and the expected large number of marijuana users attending.

A total of 766 completed questionnaires were received. Most respondees were female (63 percent), came from urban areas (91 percent), and were white (86 percent). Most were middle class and between the ages of 18 and 23.

The three measures of alienation used were Srole's scale of anomia, which measured the individual's sense of malintegration; a social isolation dimension developed by Dean; and Olsen's scale measuring political alienation. The questionnaires also gathered information on the parents' education, father's occupation, religiosity, and frequency of marijuana use. Marijuana use was classified into four categories: never, experimental (once or twice a year), occasional (from once a month to once a week), and heavy (twice a week or more). Both bivariate and multivariate analysis were used to examine the data.

RESULTS

Using bivariate analysis, alienation on all three measures increased as marijuana use increased. Social isolation was significant at the .05 level, while political alienation and anomia were significant at the .001 level.

When multivariate analysis was used to control for sex, religious affiliation, religiosity, family structure, and parents' socioeconomic status, different results were obtained. None of the relationships that were significant under bivariate analysis remained significant. No factor was significantly related to anomia when other factors were held constant. For students from intact families, greater marijuana use was positively associated with greater social isolation. Regular marijuana use was generally associated with greater feelings of social isolation for all religious denominations.

CONCLUSIONS

No direct positive association exists between marijuana use and either anomia, social isolation, or political alienation. The significant bivariate relationships were spurious.

The methodologies of studies that have not considered other relevant variables in their analysis of marijuana use and alienation are questionable. Bivariate analysis cannot assess the relationship between marijuana use and alienation.

Marijuana use does not cause alienation, at least not directly. Future research should determine which of the control variables are most important in explaining the phantom relationship between marijuana use and alienation. Although these findings apply only to a sample of college students, the need to use multivariate analysis exists for any type of sample.

Schaeffer, J.; Andrysiak, T.; and Ungerleider, J.T. Cognition and long-term use of ganja (cannabis). Science, 213(4506):465-466, 1981.

DRUG	Marijuana (ganja)
SAMPLE SIZE	10
SAMPLE TYPE	Long-term users
AGE	Young adults; mature adults (range: 25 to 36)
SEX	Both
ETHNICITY	White
GEOGRAPHICAL AREA	Southern United States; Caribbean island
METHODOLOGY	Multivariate analysis
DATA COLLECTION INSTRUMENT	Modified version of Michigan Neuropsychological Test Sequence
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	23

PURPOSE

Studies examining the mental functioning of long-term cannabis (ganja) users have generally concluded that heavy and prolonged use has not resulted in the impairment of mental and cognitive functioning. Studies of the neuropsychological effects of long-term cannabis use have been previously conducted entirely in foreign countries, such as Jamaica and Greece.

This study focused on the effects of long-term cannabis use in 10 subjects who were born, raised, and educated in the United States. The subjects were located in both a southern State and a Caribbean island and used cannabis heavily and continuously for religious purposes.

METHODOLOGY

The seven males and three females ranged in age from 25 to 36 years and had an average of 13.5 years of education. All were Caucasian. None had any history of disease related to the central nervous system. The subjects reported using a mixture of 2 to 4 ounces per day of cannabis and tobacco. The average reported length of use was 7.4 years. Subjects continued to smoke cannabis continuously even during the neuropsychological evaluations conducted for the study.

Urine samples were analyzed to determine the content of cannabinoid metabolites immediately before the beginning of the tests. The subjects were administered a modified version of the Michigan Neuropsychological Test Sequence, including the Wechsler Adult Intelligence Scale, Benton Visual Retention Test, Rey Auditory-Verbal Learning Test, Symbol-Digit Modalities Test, Hooper Visual Organization Test, Raven's Progressive Matrices Test, and Trailmaking Test. These tests assessed language and nonlanguage areas of functioning, auditory and visual memory, complex multimodal learning, and general intellectual functioning.

RESULTS

The 10 urine samples contained cannabinoid metabolites at (1 subject) or well in excess of (9 subjects) 50 nanograms per milliliter. The analysis of the cannabis showed that its THC content was more than 8 percent.

Language areas of function, nonlanguage areas of functioning, and the general level of intellectual functioning were all completely unimpaired, compared with standardized-normative information available for each test. The subjects' mean IQ scores were all in the superior to very superior range of intellectual functioning and ranged from the upper 6.7 percent to the upper 2.2 percent of the population. No transient decrements in cognitive functioning were observed.

Data on the early school achievement of two of the subjects showed that these two subjects' IQ conversion scores were virtually identical to those found in the present study.

CONCLUSIONS

The long-term use of cannabis did not impair cognitive functioning in the 10 subjects studied. These people lead active and spiritually oriented lives, engage in agriculture and business, and report cannabis as the only drug used. They appear healthy and maintain a regular diet consisting of vegetables, fruit, and some meat.

Tinklenberg, J.R.; Murphy, P.; Murphy, P.L.; and Pfefferbaum, A. Drugs and criminal assaults by adolescents: A replication study. Journal of Psychoactive Drugs, 13(3):277-287, 1981.

DRUG	Cannabis; alcohol; secobarbital; multidrug
SAMPLE SIZE	293
SAMPLE TYPE	Incarcerated juvenile offenders
AGE	Adolescents; young adults (range: 12-21)
SEX	Male
ETHNICITY	White, black, Mexican-American
GEOGRAPHICAL AREA	California
METHODOLOGY	Multivariate analysis
DATA COLLECTION INSTRUMENT	Interviews; police records; laboratory reports
DATE(S) CONDUCTED	June 1973-March 1977
NO. OF REFERENCES	32

PURPOSE

This study examines the relationships between drug use and violent crime among incarcerated male juveniles in California. The study tested several predictions based on the authors' 1971-72 study of the same subject. Among these predictions were that persons committing physically or sexually assaultive crimes would report less overall drug consumption than those not charged with these crimes, that alcohol would be the drug most often involved in both such crimes, and that cannabis would be underrepresented in such crimes in comparison to its frequency of use and to alcohol.

The study also predicted that secobarbital would be overrepresented in physically assaultive crime, that delinquents would name secobarbital as the drug most likely to increase aggression, and that cannabis would be named as the drug most likely to reduce aggression.

METHODOLOGY

The subjects were 293 male juvenile offenders incarcerated at a moderate security criminal facility of the California Youth Authority. The youths represented the most serious juvenile delinquents in northern California, because most of the State's delinquents are placed on probation or confined in local facilities.

The three study groups included 95 physically assaultive offenders, 63 sexually assaultive offenders, and a matched comparison group of 135 delinquents who had never been charged with assaultive crime. The violent offenders had all directly participated in the assaultive act and had admitted committing the offense. Included were 36 juveniles convicted of murder, 26 convicted of voluntary manslaughter, 18 of assault with a deadly weapon; 5 of assault to commit murder, and the rest of lesser offenses. The sexual offenders had all been convicted of forcible or attempted rape. The comparison group included 52 convicted of burglary, 21 convicted of auto theft, 19 convicted of robbery, 15 convicted of other kinds of theft, and the rest convicted of other offenses.

The youths were studied between June 1973 and March 1977. Information was obtained from official documents, such as police records and laboratory reports, and from semistructured private interviews conducted either by a psychiatrist or by an experienced clinical psychologist. The interviews were conducted at least 6 months after incarceration to reduce possible distortion and denial more likely immediately after incarceration. Questions concerned drug use patterns, perceptions of drug effects, drug sources, and other drug-related issues. Information given by the assaultive and sexual offenders about the specific crimes for which they were convicted was cross-validated using information from official records.

RESULTS

The three groups reported similar overall drug use patterns, including frequency of alcohol and cannabis use. Most subjects had periodic bouts of excessive drug use. Alcohol and cannabis were the most frequently used drugs, followed by amphetamines, secobarbital, and other barbiturates.

Dosages involved prior to assault were generally high. A total of 67 of 95 assaultive offenders (69 percent) used drugs shortly before the assault. Alcohol was used by 61 percent, either alone or in combination with other drugs. Cannabis was used alone or in combination by 26 percent of the subjects. Ten subjects reported using secobarbital within 3 hours of the assault. Over half of the youths who had taken drugs had taken at least two drugs.

Drugs were involved in 71 percent of the sexually assaultive cases. Alcohol, either alone or in combination with other drugs, was involved in 37 of the 48 drug-related cases, while cannabis was involved in 29 cases.

Half of the youths who had ever used secobarbital and 34 percent of the total sample viewed this drug as the most likely to increase assaultiveness; 29 percent selected alcohol. Half of the youths who had ever used cannabis--46 percent of the total sample--viewed cannabis as the drug most likely to reduce assaultiveness.

CONCLUSIONS

Results supported the predictions that alcohol was the drug most often involved in both physically and sexually assaultive crime and that cannabis was underrepresented in these crimes in comparison to alcohol. Subjects' views of the properties of secobarbital and cannabis also confirmed these predictions and the results of the authors' earlier research. These findings are consistent with the results of several other investigators. That is, cannabis generally increases positive mood states and reduces social interaction, hostility, and tendencies to inflict pain on others; by contrast, alcohol facilitates aggression.

Although tranquilizers, amphetamines, and barbiturates other than secobarbital were not linked to crime in the study, there was one violent, extremely assaultive, episode linked to extended use of amphetamines.

The assaultive attacks linked with secobarbital followed a behavior pattern of enhanced irritability and assaultive tendencies. The authors speculate that the low use of PCP reflects its lack of availability and popularity in California at the time of the study.

The similarity of the three groups' drug use patterns contrasted with the authors' 1971-72 findings. Previously, assaultive youths, particularly sexually assaultive youths, had reported less drug consumption than the comparison group. These later findings may reflect the overall

increase in drug use in all groups of California youths. The increase in polydrug involvement in violent crime probably also reflects the surge in many forms of polydrug use in California.

Brook, J.S.; Gordon, A.S.; and Brook, D.W. Perceived paternal relationships, adolescent personality, and female marijuana use. The Journal of Psychology, 105:277-285, 1980.

DRUG	Marijuana
SAMPLE SIZE	36
SAMPLE TYPE	Adolescent females
AGE	Adolescents
SEX	Female
ETHNICITY	White
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	21

PURPOSE

Studies of adolescent personality development and adjustment have assigned several paternal childrearing practices a major role as presumed antecedents of adolescent behavior. Paternal warmth and paternal positive involvement have been identified as promoting personal adjustment and personality development. However, linkages between paternal childrearing techniques and identification, the daughter's personality, and her marijuana use have not been clearly established.

This study tries to evaluate which of three hypothesized models (independent, mediational, interdependent) best explains the interplay of perceived paternal factors, the adolescent daughter's personality attributes, and her marijuana use. Aspects of the father-daughter relationship studied include affection, involvement, and the extent to which the father is perceived by his daughter as a role model.

METHODOLOGY

The study sample consisted of 36 white adolescent females from intact homes. Subjects lived in an inner-city neighborhood and most attended public schools. Trained interviewers from the National Opinion Research Center interviewed the subjects in their homes. The questionnaire consisted of close-ended questions in a prescribed order. Questionnaire items were grouped into scales designed to indicate perceived paternal childrearing practices, perceptions of the father as a role model, and the subject's personality characteristics. Final selection of the items within each scale was based on their intercorrelations and reliabilities. Paternal scale items included child-centeredness, identification, and warmth. Adolescent scale items included attitude toward deviance, autonomy, conventionality, flexibility, interpersonal aggression, and responsibility. The dependent variable was marijuana use.

RESULTS

Half of the adolescents reported marijuana use. Marijuana use was negatively related to paternal child-centeredness, warmth, and the extent to which the daughter identified with her father. Adolescent marijuana use was also negatively related to conventionality, intolerance of deviance, responsibility, and autonomy. Marijuana use was positively related to flexibility and interpersonal aggression. Multiple regression analysis showed that the adolescent personality domain was significantly related to adolescent marijuana use despite controls for the paternal domain; similarly, the paternal domain was significantly associated with marijuana use when controlled for the adolescent personality domain. About 70 percent of the variance in the adolescent female's marijuana use could be explained by the combined influence of the paternal and adolescent personality domains.

CONCLUSIONS

Results suggest that perceived paternal factors and adolescent personality attributes are independently related to the daughter's marijuana use. Thus girls with certain personality attributes may use marijuana despite the existence of a relatively benign father-daughter relationship, and girls without drug-prone personalities may use marijuana in the presence of certain types of father-daughter relationships. Results are similar to previous findings concerning mothers and demonstrate that the father has a significant and independent effect on adolescent drug use. Data underscore the extent to which the quality of the father-adolescent relationship affects the adolescent girl's marijuana use. Results suggest that paternal nurturance and a close father-daughter relationship may be important conditions for making the daughter susceptible to direct parental tuition of reward or punishment for potentially harmful behavior, and that a child-centered father may be in a better position to provide information regarding potentially harmful courses of action. Furthermore, a close relationship increases the daughter's reserves of psychic strength and probability of turning to the father for support. Data also indicate that the girl's identification with her father would acquire the personality characteristics typical of the father's cultural group. Results are consistent with those of other investigators who found that marijuana users differed from nonusers in terms of nonconventionality, nontraditionality, or nonconformity. Thus, the present study finds that marijuana users are unconventional, less responsible, more tolerant of deviance, and more likely to engage in interpersonal aggression, as well as more receptive to change. Finally, this study's subjects tend to be more dependent, perhaps more influenced by peer group pressure to take drugs. Thus, efforts to prevent and treat adolescent marijuana use must consider both personality factors and paternal childrearing patterns. Further research on the interactive processes between father and daughter and on other intrapsychic effects in the daughter is recommended.

Carter, W.E., ed. Cannabis in Costa Rica: A Study of Chronic Marijuana Use. Philadelphia, Pa.: Institute for the Study of Human Issues, 1980.

DRUG	Marijuana
SAMPLE SIZE	240
SAMPLE TYPE	Users; nonusers
AGE	Not specified
SEX	Male
ETHNICITY	Costa Ricans
GEOGRAPHICAL AREA	Costa Rica
METHODOLOGY	Survey--comparative, correlational
DATA COLLECTION INSTRUMENT	Interviews; laboratory reports/examinations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	140

PURPOSE

Because of the complexity of marijuana use and the contradictions that presently surround the understanding of it, studies that include both sociocultural and medical research yield insights that could not be obtained through the pursuit of either alone. Few studies have attempted to examine the long-term effects of marijuana use in a natural setting, combining both social science and biomedical approaches. Rarely has sufficient attention been paid to the impact of the cultural context and the need for adequate control groups. To overcome these deficiencies, the present study examines characteristics of a Costa Rican population of chronic marijuana smokers who were not at the same time polydrug users.

METHODOLOGY

The 84 users and 156 nonusers surveyed were male residents of working-class residential barrios in metropolitan San Jose, the capital of Costa Rica. The sample ranked in the middle of the working class and represented all but the lowest and highest deciles of San Jose's population. A total of 24 subjects were in commerce, 32 in transportation, 129 in building or other skilled trades, and the rest in service occupations. Incomes were slightly below average for subjects' barrios.

During the first study year, sociocultural and biomedical interviews and examinations were conducted with each member of the base sample. In the second year, a subsample of 41 users and 41 matched nonusers was chosen for in-depth studies. Matches were made on the basis of six characteristics: occupation, educational level, marital status, age, and levels of tobacco and alcohol consumption. In terms of social characteristics, the sample was remarkably homogeneous. However, similarities in structure often disguised dissimilarities in content, which only became apparent after intensive work with the matched-pair population.

RESULTS

Early family structure of future marijuana users and nonusers was basically similar. Rural origins were evident in behavior patterns such as close extended-kin relationships. Fathers supported their families, but mothers tended to be the dominant social figures during childhood. The typical family of both groups was not involved in community affairs, showed little interest in religion, and was seldom concerned with politics. Paradoxically, families seldom ate or socialized together.

However, even before reaching adolescence, users were developing along different lines from nonusers. Users tended to be individuals who came from weakly constituted families, who had absent and moralistic mothers, who suffered from disciplinary inconsistencies and sibling rivalry, who lived in poverty, and who had begun to have serious problems with major institutions, such as schools and the justice system. Marijuana users, like drinkers, had frequently had an early hostility to authority and institutional controls and had abandoned their familial homes at an early age. Peer groups assumed primary importance as a source of behavioral models among individuals who left home.

Both groups usually left school to support their families, but users tended to change jobs frequently, to engage in extralegal activities for additional income, to move often, to become involved in legal entanglements, and to shun organizations and church membership. In short, they replicated in their adult lives patterns from which they had suffered as children. Stable marijuana smokers, however, were characterized by family situations, patterns of employment, income, debt, and accumulation of material possessions similar to those of nonusers.

Users were classified as stable smokers, street movers, and pastoralist-escapists. Stable smokers preferred to smoked at home or on the job; street movers, on street corners; and pastoralist-escapists, in secluded rural settings. While street movers seemed to look to marijuana for escape from their everyday routine, stable smokers had established a way of life that included marijuana as an amenity to make the daily routine more bearable. For most users, marijuana smoking had begun in adolescence during periods of transition and stress.

Overall, few subjectively perceived adverse effects of marijuana use were reported over the 2-year period. In areas of personal and social life, marijuana was not shown to result in behavior that impaired the individual's ability to function as a regular member of society. Conversely, heavy marijuana use was often correlated with employment stability, low unemployment, and acquisition of material goods. The significant differences found between users and nonusers tended to have their roots in socialization events antedating marijuana use, especially in the case of street movers. When deviant behavior was encountered, marijuana appeared to be more a correlate than a cause.

As in U.S. studies, heavy marijuana use was related to use of other substances (i.e., alcohol and tobacco), and marijuana was reported to suppress rather than to stimulate aggression. In contrast to American findings, however, users did not avoid contacts with nonusers, users showed little interest in trying other psychoactive drugs, and mothers of users did not tend to be users themselves (although they did tend to work outside the home). Furthermore, marijuana did not appear to impair short-term memory processes, and no withdrawal symptoms were reported.

In contrast to nonusers, marijuana users more commonly had gastrointestinal complaints and urinated frequently, used barbiturates more often, and exhibited lower weight and blood pressure, as well as pterygium. The 2-hour postprandial glucose levels were significantly higher in the 41 users than in controls, although the values of both groups were in the normal range. Visual function studies failed to demonstrate clinically significant differences between users and nonusers, but findings such as photosensitivity, decreased dark adaptation, and decreased visual

acuity suggest increased irritation of the anterior segment of the eye in users. No significant differences were revealed in sleep patterns, ventilatory and pulmonary parenchymal function, plasma testosterone levels, nutrition, and neuropsychological variables. However, personality differences were found between street movers and stable smokers; these findings supported the differences observed in lifestyles.

CONCLUSIONS

Contrary to the expectations of the research team, no real consequences of prolonged marijuana use were apparent. This finding is in keeping with results of the only other serious studies of chronic effects in which intervening sociocultural variables have been properly controlled. The study clearly shows the difficulty in separating sociocultural from physiological determinants. Further, the need to coordinate public policy on drug use with sound scientific research on drug effects is emphasized.

Dembo, R.; Schmeidler, J.; and Burgos, W. Life-style and drug involvement among youths in an inner city junior high school. The International Journal of the Addictions, 15(2):171-188, 1980.

DRUG	Marijuana; alcohol; multidrug
SAMPLE SIZE	1,045
SAMPLE TYPE	Junior high school students
AGE	Adolescents
SEX	Both
ETHNICITY	Black; Puerto Rican
GEOGRAPHICAL AREA	New York City
METHODOLOGY	Correlational study; multivariate analysis
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Winter 1976
NO. OF REFERENCES	31

PURPOSE

The growing sophistication of drug research is reflected in two major research trends: an emphasis on the extent of drug use rather than on a person's taking of one particular drug over another and interest in social and cultural experiences that influence individual drug use. Studies in the latter area have shown that patterns of substance abuse among youths are socially learned, reinforced by their peers, and may reflect involvement in an expressive lifestyle.

Using the sociocultural perspective, this study examined the influence of demographic characteristics, views of the neighborhood, friends' substance use, and recreational activities on substance use (particularly of alcohol and marijuana) among inner city junior high school students.

METHODOLOGY

A total of 1,045 seventh, eighth, and ninth grade students in a New York City school completed questionnaires asking for information on their backgrounds; orientation toward the neighborhood; peers' perceptions of the status of different neighborhood residents; friends' drug use; spare-time activities; and the use of alcohol, marijuana, LSD, depressants, narcotics, solvents, and stimulants. All responses were confidential.

Of the total respondents, 52 percent were girls and 46 percent[1] boys. Over half resided with both parents, although 36 percent lived with mother-headed households. Forty-three percent were Puerto Rican and 41 percent black, with the remainder evenly divided among other ethnic groups. Most youths came from low to moderate socioeconomic backgrounds.

RESULTS

While less than 7 percent indicated they used depressants, LSD, narcotics, solvents, and stimulants, 46 percent claimed the use of alcohol and 24 percent marijuana during their lifetimes. Figures for the 6-month period prior to this survey were 33 percent and 19 percent for alcohol and marijuana, respectively. A Guttman analysis covering 80 percent of the sample showed that 35 percent admitted ever using alcohol, and 21 percent claimed ever using marijuana.

There were no ethnic group differences in drug involvement and no statistically significant associations between socioeconomic status and drug use. However, multiple regression analyses found three strong predictors of drug involvement; they are, in decreasing order of magnitude, drug/street culture spare-time activities; friends' use of marijuana and alcohol; and the esteem given drug-using, gang-related individuals by one's peers.

CONCLUSIONS

The study's results strongly suggest that youths' involvement with drugs is an evironmentally related phenomenon. Because youths' orientation toward the tough, streetwise role models in their neighborhoods is a major determinant of drug use, training of drug misuse intervention agents should include experience in incorporating in such programs non-drug-abusing individuals who are respected by youths. While prevention projects for nonusers could be located in schools, efforts directed toward youths already involved with drugs should be situated in storefronts or favorite hangouts. Such efforts could focus on developing greater awareness about the effects of taking various substances, possibly involving drug users who have established nondestructive relationships with various substances.

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[1]This total does not equal 100 percent because of the exclusion of nonresponses and "don't know" answers.

Eisenman, R.; Grossman, J.C.; and Goldstein, R. Undergraduate marijuana use as related to internal sensation novelty seeking and openness to experience. Journal of Clinical Psychology, 36(4):1013-1019, 1980.

DRUG	Marijuana
SAMPLE SIZE	278
SAMPLE TYPE	Undergraduate Catholic, Jewish, and Protestant college students
AGE	Young adults
SEX	Both
ETHNICITY	Predominantly white (at least 90 percent)
GEOGRAPHICAL AREA	Philadelphia, Pennsylvania
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Questionnaires; California F Scale; Personal Opinion Survey; Pearson novelty seeking scales
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	21

PURPOSE

Numerous studies have characterized college marijuana users as open to experience, adventuresome, and rebellious compared to nonusers, who are generally more rule abiding, responsible, and conventional. This study hypothesizes that internal sensations associated with novelty seeking would be correlated significantly with frequency of marijuana use along with creativity and adventuresomeness. In contrast, a negative relationship is expected for authoritarianism. Moreover, if theories regarding the adverse effects of long-term marijuana use on personal functioning are correct, creativity and adventuresomeness should decrease with extended use.

METHODOLOGY

The sample consisted of 148 males and 130 females registered in undergraduate psychology courses at Temple University and Pennsylvania State University, Ogontz Campus. Most were white, middle-class, and living in or near Philadelphia. The breakdown according to sex and religion was 52 Catholic males, 54 Catholic females, 39 Protestant males, 36 Protestant females, 44 Jewish males, 40 Jewish females, and 13 males with no religious preference. All participants took the following tests: the California F Scale to measure authoritarianism, the Personal Opinion Survey as a measure of creativity and adventuresomeness, a 12-item test developed to test for

acquiescent response set, and an abridged version of the five Pearson novelty seeking scales. Information was also collected on age, birth order, frequency and length of marijuana use, and history of other drug use. All subjects were divided into four levels of frequency of marijuana use: nonusers, experimental users, moderate users, and heavy users. Length of use was categorized as 12 months or less, 13 to 24 months, and 25 months or more.

RESULTS

As frequency of marijuana use increased, creativity and adventuresomeness also increased. Moderate and heavy users tended to be less authoritarian than nonusers and experimental users, but the difference was not significant. On the dimension of novelty seeking, only internal sensation seeking increased with the frequency of drug use. The only personality variable related to length of time using marijuana was desire for novelty, which declined significantly after 2 years of use.

Males were more frequent users than females, and Jews were more frequent users than Protestants and Catholics. The use of hashish, opium, amphetamines, LSD, and barbiturates increased significantly as marijuana use became more frequent. Intercorrelations between variables related to frequency of marijuana use were significant between creativity and internal sensation seeking and between adventuresomeness and internal sensation seeking.

CONCLUSIONS

It appears that undergraduate marijuana users, compared to nonusers, are more creative and may have, therefore, an increased fantasy life. It is likely that a person with this personality trait would value marijuana's fantasy-facilitating properties, although actual use would depend partly upon adventuresomeness, flexibility, and political ideology.

The description of marijuana users as open to experience (highly creative and adventuresome and not very authoritarian) involves openness to a particular kind of experience, namely internal sensation seeking. From this perspective, males use marijuana more often than females because they are encouraged to be adventuresome, and Jews, who have been found to be less authoritarian than persons of other religions, are also more frequent users. The study found that after 2 years of use subjects expressed a decrease in boredom and an increase in interest in the environment or creativity. It seems, however, that adventuresomeness or desire for novelty is not motivated by boredom, since the decrease in boredom was not accompanied by an increase in the other two measures.

The authors warn that their results are valid only for the specific personality tests used and for the urban, white, middle class population studied.

Ferraro, D.P. Acute effects of marijuana on human memory and cognition. In: Petersen, R.C., ed. Marijuana Research Findings: 1980, National Institute on Drug Abuse. Washington, D.C.: Supt. of Docs., U.S. Govt. Print. Off., 1980.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not specified
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	97

PURPOSE

Early clinical accounts of the psychological syndrome of marijuana intoxication have been verified by subsequent psychological descriptions. Weil and Zinberg have hypothesized that the acute effects of marijuana on speech, an activity noticeably affected during intoxication, are due mainly to a drug-induced impairment of the user's memory.

This paper reviews the recent literature concerning the acute effects of marijuana on human memory and cognition.

SUMMARY

Cognitive tasks. Marijuana clearly hinders speaking, thinking, attending, and other cognitive functions. One possible interpretation of some of these impairments is that marijuana acts mainly to disrupt memory and through this mechanism causes cognitive dysfunction. However, the evidence supporting this interpretation is inferential and sometimes equivocal. Varying experimental outcomes, potential additional determinants of performance, confusion regarding which dependent variables to use, and lack of an adequate theoretical framework have all led to efforts to directly study the effects of marijuana on memory.

Memory tasks--free recall. In free recall, the material to be recalled is not present and the subject is not required to recall the material in any particular order. When learning takes place in a nondrug state, studies have consistently shown that marijuana has no effect on the free recall of simple verbal material. However, a person under the influence of marijuana has a reduced ability to freely recall events learned when intoxicated by marijuana. This drug-induced impairment is generally insensitive to practice, rehearsal, or cueing, and the effect has been observed using a wide variety of verbal and pictorial material.

Material learned in the marijuana state is not better recalled in the marijuana state than in the nondrug state. However, for material that has been organized by categories or by sequential order during learning, recall of material in the same drug or nondrug state as existed during the learning phase seems to be consistently better than recall of material in a changed state.

Recognition memory. Comparatively little research exists on marijuana's effects on recognition memory, which entails the identification of previously presented material from an array of old and new material. Available research indicates that the person who becomes intoxicated with marijuana risks the possibility of an impaired memory. Marijuana's acute effects on recognition memory depend partially on the drug condition present at the time of the original learning, as well as during the recognition test. No study has shown that marijuana aids recognition memory.

For material learned in the nondrug state, recognition memory appears to be the same for subjects in the nondrug state as for those under the influence of marijuana. However, subjects who are under the influence of marijuana tend to make erroneous positive identifications of material that had not been previously presented. Marijuana use immediately prior to the initial learning task produced a small reduction in subsequent recognition memory in two experiments.

CONCLUSIONS

Marijuana has a generalized detrimental effect on memory just as it does on cognition. The acute effects are sometimes small. The impairments are greater when free recall procedures are used than when recognition procedures are used.

Gersten, S.P. Long-term adverse effects of brief marijuana usage. Journal of Clinical Psychiatry, 41(2):60-61, 1980.

DRUG	Marijuana
SAMPLE SIZE	2
SAMPLE TYPE	Normally functioning individuals who developed psychiatric disturbances after one-time use
AGE	Young adults
SEX	Male
ETHNICITY	White
GEOGRAPHICAL AREA	Connecticut
METHODOLOGY	Case study; clinical observation
DATA COLLECTION INSTRUMENT	Interviews, observations, medical records
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	6

PURPOSE

For persons with no prior psychopathology, marijuana may be relatively harmless at moderate doses. However, marijuana use can be risky for persons who may be predisposed to develop a psychiatric disorder. Cases have been described in which schizophrenic persons who were well controlled with medication had relapses, apparently from the use of marijuana. Psychotic reactions secondary to prolonged marijuana use have also been reported.

This paper presents two cases seen by a private practitioner in psychiatry. Both cases involved normally functioning individuals with no known psychiatric illness but with mild to moderate underlying psychopathology. Both developed significant psychiatric disturbances after smoking marijuana once.

SUMMARY

Case 1. A single white 20-year-old man was brought for psychiatric help by his father. He complained of pains all over, feelings of "dying inside," and of not being able to feel his body. He also experienced anxiety and stated that he felt nonexistent and was receiving commands from within. These problems had begun 1 month before when he experienced feelings of panic and depersonalization immediately after smoking marijuana in a pipe. He stated that this was the

first time he had tried marijuana and that he had not tried other hallucinogens. His girlfriend of 3 years had left him 2 months before the marijuana episode.

His symptoms had lasted for 4 days, disappeared, and recurred a month later following a viral infection. His symptoms grew worse despite psychotherapy and phenothiazine administration. The patient was hospitalized about 2 months after the marijuana episode. After 3 months he was released from the hospital and had no somatic complaints except for some depersonalization. After discharge from the hospital he moved away from home for nearly a year and continued both the medication and psychotherapy. He then lost his job, returned to his parents, stopped his medication, and experienced a recurrence of some of his symptoms.

Case 2. A 21-year-old single white man presented for hospitalization with the complaint that he was obsessed with the idea of being a homosexual. Three months earlier he had smoked marijuana at his all-male college. While he was high another student told him that "we don't want guys like you and your roommate around." The patient became convinced that he was homosexual. He had thought about homosexuality before but had not focused on it. He had been rejected by a girl 1 week prior to the marijuana episode.

The patient had been afraid of the dark as a child and had had a school phobia. Although he became paranoid and obsessed with dirt and body odors during his teens, he functioned well at home and had friends at school. His prior marijuana use consisted of occasional use during the past 2 years. He had not used other psychedelic drugs and had not been under psychiatric care.

His hospitalization lasted 10 months. He received phenothiazines, antidepressants, and ECT. At discharge he was functioning marginally and was still depressed and concerned with homosexuality.

CONCLUSIONS

Marijuana use on a specific occasion was associated with the development of a chronic psychiatric disorder in both cases. Marijuana appeared to act as a precipitant in the decompensation of these individuals, who had had some prior difficulties but who had been functioning well. Environmental stresses were also present and may have been predisposing factors in both cases.

Clinicians should caution any of their disturbed patients regarding marijuana use. Those who are at risk include schizophrenic patients, persons suffering from other emotional disturbances, and persons who are going through a stressful period.

Harclerode, J. The effect of marjuana on reproduction and development. In: Petersen, R.C., ed. Marijuana Research Findings: 1980, National Institute on Drug Abuse. Washington, D.C.: Supt. of Docs., U.S. Govt. Print. Off., 1980. Pp. 137-166.

DRUG	Marijuana, THC
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Both
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	145

PURPOSE

Marijuana is now known to have significant effects on all phases of reproduction and development in members of both sexes and in all the species studied, including humans. These changes may be caused indirectly by a change in the circulating hormones in the blood, directly by marijuana's physiologically active ingredients on reproductive structures, or by a combination of direct and indirect action.

This paper reviews the recent literature on the effects of marijuana on reproductive systems and behavior in both males and females.

SUMMARY

Cannabinoids have been shown to have an effect on the reproductive tissues of males of many animal species. Marijuana's endocrine effects in the human male appear to be similar to those in rats and mice. Decreases in luteinizing hormone and testosterone and increases in abnormal sperm have been reported. These effects appear to be reversible; recovery occurs after cessation of use.

It has been reported that chronic smoking of marijuana by human females (at least three times per week for the preceding 6 months) increased the number of menstrual cycles where no ovulation occurred or menstrual cycles marked by inadequate luteal phase in the human female. This study raises important questions about the effect of marijuana on the human menstrual cycle, since, if confirmed by future studies, marijuana might contribute to female infertility. Nursing and normal lactation may also be impaired by the lowered prolactin levels in the blood. The study itself, however, should be repeated in a research ward setting.

The major depressive effect of cannabinoids on the male and female reproductive tract appears to result from the inhibition of luteinizing hormone releasing factor with subsequent depression of the release of luteinizing hormone. Lack of luteinizing hormone stimulation or direct action of the ingredients in marijuana may affect female reproductive structures.

While the rat adrenal gland has been shown to respond to THC, no changes have been reported for humans. Marijuana smokers and control did not differ in the excretion of major urinary metabolites of cortisol. The frequent use of marijuana also did not change the adrenal cortex's ability to respond to synthetic corticotropin stimulation.

Some experimental evidence supports the claim that cannabinoids depress some reproductive functions by inhibiting prostaglandin synthesis. Animal studies have produced differing results regarding THC's effects on the length of gestation and amount of weight gain. Lactating animals treated with cannabinoids experienced reductions in milk production. Cannabinoids by themselves are probably not teratogenic in view of the relatively large doses required to produce developmental anomalies in lower animals. However, cannabinoids may promote the teratogenicity of known teratogens by lowering the threshold at which they have their effect.

The few reports examining the effects of marijuana and marijuana constituents on reproductive behavior have focused on mating and have placed little emphasis on other sexual behaviors. Cannabinoids have produced reduced reproductive activity in rats and mice.

The reports on marijuana's effect on human sexual behavior have generally been based on self-reports. Some have reported increased sexual stimulation in view of prolonged sexual desire and sexual performance in both males and females. Nevertheless, cannabis is used as a sexual depressant in India and other countries. Additional studies have reported stimulation of sexual thoughts after cannabis administration, an increase in sexual pleasure after marijuana use, and a decrease in sexually assaultive behavior after use. Many of the reported effects may not be due to cannabis directly but may, rather, reflect the sensation-seeking and risk-taking lifestyle of the marijuana user. There may be a placebo reaction involved. Possibly, marijuana may increase vasodilation in the genitals caused by reduction of sympathetic tone. The appreciation of sexual performance might also be affected by an altered perception of time. Heightened appreciation of sexual activity may be caused by a delay of ejaculation as well as a more intense perception of tactile stimulation. While the acute use of cannabinoids at low doses appears to enhance sex drive, high doses result in the depression of sexual desire and even impotence, possibly because of decreased plasma testosterone levels.

CONCLUSIONS

Cannabinoids significantly depress reproduction and development. A variety of mechanisms may be involved in producing these effects. Cannabinoids also decrease milk production and lactation. Cannabinoids may act directly on the mammary tissues to decrease milk production. Although high doses of cannabinoids appear to inhibit reproductive behavior, lower doses may promote this behavior through their actions on other physiological systems, their effect on time perception, their delaying of ejaculation, and their effects on perceptions of tactile stimulation during the sex act.

Huba, G.J., and Bentler, P.M. The role of peer and adult models for drug taking at different stages in adolescence. Journal of Youth and Adolescence, 9(5):449-465, 1980.

DRUG	Marijuana; alcohol; amphetamines and tranquilizers
SAMPLE SIZE	1,634
SAMPLE TYPE	Junior and senior high school students
AGE	Adolescents
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Los Angeles, California
METHODOLOGY	Secondary analysis; multivariate analysis; correlational analysis
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	18

PURPOSE

The initiation of drug use by adolescents is known to be strongly influenced by peer and adult models. Patterns of drug taking are transmitted across generations by salient adult models, and formation of friendship circles with drug-using peers is a causal influence in drug taking. However, research has generally not focused on the relative influences of adults and peers at different stages of adolescence. The volatility of adolescence suggests that adult and peer models may have differential importance in early, middle, and late stages. It is also known that peer and adult influences on drug taking appear to vary according to the type of substance used, that is, peer and adult models for alcohol use influence alcohol use but not marijuana use, and peer and adult models for marijuana use are related to frequency of marijuana smoking.

This study tested five hypotheses concerning the relative importance of adult and peer models on different types of substance use, including marijuana use, and examined the interaction between these influences and the individual's stage of adolescent development. The hypotheses were tested separately for males and females.

METHODOLOGY

The subjects were 1,634 students in the 7th, 8th, and 9th grades in 11 schools in the greater Los Angeles, California, area. These schools were selected from a larger sample asked to participate in a drug study. Both students and their parents were aware that the confidentiality of responses was legally assured.

The questionnaires gathered information on the frequency of use of 13 licit and illicit drugs and on the students' interactions with their parents, peers, and significant adults. The questions also covered the frequency of use of various substances by peers and adults. For the present study, the authors selected certain substances and grouped these into four broad categories: beer and wine, hard liquor, marijuana, and pills (amphetamines and tranquilizers).

One-way analyses of variance were computed separately for each sex, using grade in school as the classification factor.

The chi-square test, the F test, the t test, and the Dunn-Clark z statistic were also used in the testing of hypotheses.

RESULTS

Most of the variables were significantly influenced by the student's grade level. As the grade level increased, females showed a significant linear increase in the rate of drug use in all four categories, and males showed a significant increase in the frequency of use of all drugs except pills.

As the youths progressed from the seventh to ninth grades, they appeared to become more aware of alcohol and marijuana use by peers and adults. Both male and female adolescents perceived increasing percentages of their peers as drug users of various sorts as adolescence progressed. However, neither boys nor girls perceived an increasing pervasiveness of adult or peer pill use during the interval of adolescence studied.

For girls at all ages and for boys in the ninth grade, a higher correlation was found between self-use and perceived peer use than between self-use and perceived adult use, for all four categories of substances.

Changes in the correlation between self-use and adult use across different ages in early adolescence were small and generally not statistically significant. Changes in the correlation between self-use and peer use of marijuana and pills among different-aged individuals were large and statistically significant for both sexes. The use of these substances may be initiated later than alcohol because they are more difficult to obtain and more illegal.

CONCLUSIONS

As adolescence progresses, self-use of marijuana and other drugs appears to become increasingly consistent with perceptions of peer use, whereas adult models become relatively less important. The increasing relationship between self-use and perceived peer use probably represents the young user's effort to justify drug use by believing that friends also use the drug. It probably also represents the greater susceptibility to peer influence of youths making the transition from junior high to senior high school.

Jessor, R.; Chase, J.A.; and Donovan, J.E. Psychosocial correlates of marijuana use and problem drinking in a national sample of adolescents. American Journal of Public Health, 70(6): 604-613, 1980.

DRUG	Marijuana; alcohol
SAMPLE SIZE	10,405
SAMPLE TYPE	Junior and senior high school students
AGE	Adolescents
SEX	Both
ETHNICITY	White; Spanish American; black; Native American; Asian
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Survey--correlational and comparative
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	1974
NO. OF REFERENCES	31

PURPOSE

Much research has shown psychosocial and behavioral differences between marijuana users and nonusers and between heavy users and moderate users. However, most of this research has been atheoretical, limited to a few measures, or based on small or selected samples. The present study approached variation in marijuana use from the more comprehensive social-psychological approach, problem behavior theory. This approach treats marijuana use as one case of a larger class of problem behaviors likely to produce negative sanctions from the larger society. Problem behavior proneness in the personality system refers to attitudes, values, beliefs, and expectations that constitute incentives to engage in problem behavior or reduce controls against such behavior. In the environmental system proneness to problem behavior refers to perceptions of low supports and controls from significant others and approval and models for engaging in problem behavior. In the behavior system such proneness refers to the degree of involvement in other problem behaviors, on the one hand, and in conventional behaviors, such as school performance, on the other.

This study examined the personality, social, and behavioral correlates of involvement with marijuana in a 1974 survey of a nationwide sample of over 10,000 junior and senior high school students. Goals were to test the usefulness of a social-psychological theory of youthful problem

behavior in accounting for varying marijuana involvement; to examine differences across sex, age, and ethnic groups; and to compare the psychosocial correlates of marijuana use with the psychosocial correlates of problem drinking found in an earlier analysis of the same data.

METHODOLOGY

Data were drawn from the 1974 National Study of Adolescent Drinking Behavior, Attitudes, and Correlates carried out by the Research Triangle Institute under contract with the National Institute on Alcohol Abuse and Alcoholism. A two-stage, stratified random sample was drawn from the adolescent population in grades 7 through 12 in the 48 contiguous States and the District of Columbia. A total of 13,122 students representing 81 percent of the students contacted completed study questionnaires. The sample was 48 percent male, 69 percent white, 12 percent Spanish American, 7 percent black, 6 percent Native American, and 2 percent Asian. Subjects completed a 35-page self-administered questionnaire consisting mainly of closed-format questions. Confidentiality was guaranteed through the use of an elaborate system of identification numbers. The five personality system variables assessed included the value on independence relative to the value on academic achievement, expectations for academic achievement, attitudinal tolerance of deviance, religiosity, and reasons for drinking. The seven perceived environment system variables included such items as compatibility between parents' and friends' expectations and friends' pressure for marijuana use. The five behavior system variables included frequency of general deviant behavior, frequency of drunkenness in the past year, drug use, frequency of church attendance in the past year, and school performance as measured by grade-point average. The results presented here are based on the 10,405 adolescents whose answers to the questions on drinking and drug use behavior were logically consistent and who answered all 4 of the questions that assessed involvement with marijuana. The four items were found, through scalogram analysis, to form a satisfactory Guttman scale.

RESULTS

Significant correlations were found between the personality, environmental, and behavioral variables and marijuana use. The relationships held across differences in age, sex, and ethnic group membership. Greater involvement in marijuana use was associated with greater value on independence than on academic achievement, lesser religiosity, greater tolerance of deviance, less compatibility between friends and parents, greater influence of friends relative to parents, greater models and support for problem behavior, greater actual involvement in other problem behaviors such as drunkenness, and less involvement in conventional behavior such as attending church. Multiple regression analyses showed that this pattern of psychosocial correlates accounted for over half of the variation in marijuana use. The pattern was nearly identical to the pattern that accounts for problem drinking in these same adolescents.

CONCLUSIONS

Findings indicate that marijuana use is best seen as part of a syndrome of adolescent problem behavior. Specific risk factors in the individual's immediate environment may channel a general psychosocial proneness to problem behavior into the specific problem behaviors in which the individual becomes involved. Results demonstrate the explanatory usefulness of all three of the theoretical systems: personality, environment, and behavior. The observed relationship between marijuana involvement and problem drinking among American adolescents is an association that is worth particular public health attention. Primary prevention, intervention, or health promotion approaches directed at adolescents need to consider the relation between these behaviors rather than dealing with them as though they were separate kinds of action.

The study is limited because the findings do not apply to dropouts or those not attending school. Other restrictions include the limited numbers of variables used, the limitations of the self-report method, and indications that some of the measures were not effective in several of the sex-by-ethnic subsamples. Despite these limitations, the findings are internally consistent and parallel findings in related studies. In addition, they replicate across sex, age, and ethnic group boundaries and are consonant with problem behavior theory. This theory thus appears to be a useful frame of reference from which to approach adolescent problem behavior, including drug and alcohol use, and the findings appear to have significant implications for public health policy.

Johnston, L.D. "The Daily Marijuana User." Presented at the National Alcohol and Drug Abuse Conference, Washington, D.C., Sept. 18, 1980.

DRUG	Marijuana
SAMPLE SIZE	Approximately 3,600
SAMPLE TYPE	High school graduates
AGE	Young adults
SEX	Both
ETHNICITY	Cross-cultural
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Survey--longitudinal
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	1979
NO. OF REFERENCES	0

PURPOSE

Between 1975 and 1978, the proportion of high school seniors who used marijuana daily rose from 6 to 11 percent. Although this proportion has leveled off since 1978, perhaps because of newer biomedical findings of potential hazards of marijuana use, a substantial fraction of the newest generation reaching adulthood are daily users. Few data are available concerning who these people are, how long their habit will last, or what the long-term effects will be for their health, productivity, or happiness. The present study uses data from an ongoing research program, Monitoring the Future, to examine the characteristics of the daily marijuana users in the years following their graduation from high school.

METHODOLOGY

From 16,000 to 19,000 high school seniors have completed self-administered questionnaires each year since 1975. A subsample from each class is obtained for 6 years after they leave high school. Most of the data reported here are based on the 1979 followup study of the four previous graduating classes. This survey is essentially based on a national sample of young adults

in the age range of 19 to 22 who are high school graduates. Total sample size was about 3,600 and represented a response rate of more than 80 percent.

RESULTS

During the senior year of high school, daily use was 13 percent among males and 7 percent among females, 13 percent among the noncollege bound and 7 percent among the college bound. Daily use related positively with community size, truancy from school, hours worked on a paid job in senior high school, and income. Daily use as reported by black students was only about half that reported by whites. Daily use was quite evenly spread across socioeconomic groups and was only slightly higher among those from homes with one or both parents absent. Use was lower among those who were conservative politically and among those having had some religious commitment. Daily use was higher among those going out frequently at night.

In the "after high school" sample, 11 percent of single persons and 6.6 percent of married persons were daily users. Those without children were somewhat more likely to use marijuana than were those with children. Those living away from home showed a higher incidence of daily use than those still living with their parents. Student status after high school correlated negatively with daily use. Daily users constituted 14 percent of those who were unemployed, 13 percent of those with a full-time civilian job, and 12 percent of those who were in the military service. Daily use was highest for those living in a rented room and lowest for those living in a college dorm. Although full-time students had a lower than average rate of daily use, they showed the greatest increase after high school.

Frequent marijuana users also had a tendency to use other drugs. Over one-fourth of the daily pot users in the class of 1979 also drank daily, versus only 7 percent for the age group as a whole. In addition, 59 percent of the daily marijuana users also smoked cigarettes daily, versus only 25 percent for the age group as a whole. Current usage rates for the various other illicit drugs generally were five to seven times the average for the age group as a whole.

Reasons given for marijuana use included feeling good or getting high, having a good time with friends, relaxation, and relief of boredom. Other reasons included getting away from problems, anger or frustration, and getting through the day. Nearly all daily users also mentioned that most or all of their friends smoked marijuana and drank alcohol and that some of their friends got drunk weekly, smoked cigarettes, and used other illicit drugs. Daily marijuana users thus appeared to be immersed in a drug-using friendship circle.

The followup data also showed that daily marijuana use tends to be a relatively stable behavior, at least through age 22. The daily prevalence rate for each graduating class rose in the years after high school. Modal amount of use was two to three joints per day, although about one third of the group used four or more joints per day. The two surrogate measures of the amount of THC consumed have not increased during the study; these measures include the degree and duration of highs experienced. Users appear to be rolling smaller joints of the strong marijuana now available. Only about 8 percent of the seniors who were daily users were aware of negative health consequences of their use. Loss of energy, loss of interest in other activities, and poorer job or school performance were the problems most commonly reported by daily users.

CONCLUSIONS

The high overlap of marijuana use and cigarette smoking is a basis for concern about the long-term physical health of this segment of the population. In addition, the high overlap of regular marijuana use and the use of many other substances, including cigarettes, will make more difficult the research task of determining the long-term effects of chronic marijuana use. Despite these interfering factors, however, many daily users themselves saw some negative consequences following from their habit. The stability of daily use increases the probability of cumulative, long-term effects. A substantial number of people are at risk of whatever the long-term consequences will be, especially those consequences that coincide with those of cigarette smoking. Further research will examine such questions as the effect of daily use on role status attainment and role performance.

Jones, R.T. Human effects: An overview. In: Petersen, R.C., ed. Marijuana Research Findings: 1980, National Institute on Drug Abuse. Washington, D.C.: Supt. of Docs., U.S. Govt. Print. Off., 1980. Pp. 54-80.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not specified
ETHNICITY	Cross-cultural
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	60

PURPOSE

The task of reviewing the literature on the effects of cannabis on humans has been complicated by the rapid growth of the literature since the 1960s. For example, the Addiction Research Foundation in Toronto, Canada, currently has about 5,000 articles on cannabis, of which more than 1,000 are directly relevant to human health effects.

This paper reviews selected literature on the botany and chemistry of marijuana as well as on its physiological and psychological effects on humans.

SUMMARY

The cannabis sativa plant, from which marijuana and hashish are derived, contains over 400 chemicals, including THC, the major source of psychoactivity. Other cannabinoids have biological activity although they have little or no psychoactive effects. The percentage of THC varies widely among different types of cannabis. The amount of THC absorbed by an individual varies with the method of administration.

THC leaves the blood rapidly both because of metabolism and because of its efficient uptake by tissues. While stored in body fats, THC and its metabolites are slowly released back into the

bloodstream. THC and its metabolites are cleared from the body more slowly than some other psychoactive drugs. In frequent users, the terminal half-life of THC is estimated at about 19 hours. The half-life of THC metabolites appears to be about 50 hours. The slow clearance may make for cumulative toxicity. Uptake of THC is rapid in tissues with high blood flow and in the ovaries and testes.

Mass spectrometry combined with either high pressure gas or liquid chromatography is the only completely accurate and sensitive method for quantifying and identifying cannabinoids in bodily fluids. Simple techniques for identifying THC levels in the body and predicting driving impairment or other abnormal behavior are far from being available for practical application.

Varied smoking techniques result in a broad range of actual ingested doses per experience or per unit of time. Most laboratory investigators use marijuana cigarettes containing from 10 to 20 mg of THC, in part because these standardized marijuana cigarettes are available from the National Institute on Drug Abuse. Slightly less than half the THC in a marijuana cigarette is delivered to the lungs in smoke. The THC probably reaches the brain within about 14 seconds of inhalation. THC has been estimated to be three to five times more potent when inhaled than when ingested.

Moreau's description of psychological effects of cannabis intoxication in Hashish and Mental Illness, first published in 1845, was based on much larger doses than used by most current North American users. The descriptions in that book are vivid and detailed, and to a certain extent, current studies only expand on Moreau's work. Moreau described an initial feeling of euphoria mixed with excitement and dissociation of ideas, followed by altered senses of time and space, subjective enhancement of the senses, and other effects including, at the highest doses, hallucinations. Moreau induced symptoms of or mimicking psychosis in normal persons. Most current American users describe senses of well-being, relaxation, drowsiness, mild perceptual changes, and altered time senses. Environmental factors such as the setting and nonenvironmental factors such as expectations probably also affect the intoxication experience.

The most notable acute effects of marijuana are changes in cognition, thinking, sensation, and psychomotor functions. These psychological effects are both more predictable and generally larger than most of the physiologic effects. Although users report subjective feelings of enhanced sensory acuity, sensitivity, and interpersonal closeness, in fact, generally there are either no effects or an impairment of performance, sensation, and behavior. The degree of impairment is generally related to the dose. In studies where psychological effects were not readily measured, generally low doses of the drug or subjects with high levels of tolerance appear to have been used. When large doses of marijuana are combined with testing at the time of peak intoxication, it is possible to show dramatic alterations.

At moderate to high doses, many physiologic systems are changed. An increased heart rate proportional to the dose of THC is one of the more reliable effects of ingesting marijuana. The effect on blood pressure depends on the subject's body position during the measurement of blood pressure. Long-term administration of oral THC can result in a decrease in heart rate and a persistent mild lowering of blood pressure. The deep inhalation associated wiith smoking marijuana probably means that the lungs retain more than the 70 percent of particulate matter retained from tobacco smoke. Cannabis produces more tar than an equivalent weight of tobacco, and the way in which it is smoked aids the deposition of tar in the lung. Chronic exposure to marijuana smoke appears to impair many of the lung's defense mechanisms and to produce cellular and possibly precancerous changes in lung tissue.

Cannabis also clearly changes brain function, but the data do not clearly show whether or not the neurological changes persist or cumulate over long periods of time. Acute cannabis intoxication impairs judgments of distance and time, memory for recent events, the ability to learn new information, and physical coordination. At slightly higher doses the acute intoxication also includes tremor, transient muscular rigidity, or myoclonic muscle activity. While scalp electroencephalograms (EEGs) show minimal changes, marked changes in electrical activity have been recorded from electrodes implanted in deep brain structures. Changes in sleep EEGs are fairly large. Studies also generally agree that cannabis has detrimental effects on complex psychomotor-cognitive performance in such tasks as driving, flying, and instrument operation. The issue of impaired neurological functioning beyond the period of acute intoxication is a source of controversy, particularly because of the varying doses involved. The weight of the evidence to date is that lasting neuropsychological impairments are possibly but not inevitably associated with some undetermined level of heavy, prolonged cannabis use.

Whether or not marijuana causes psychosis or other mental illness is unclear. The most common adverse psychological reaction to marijuana use is an acute anxiety reaction during marijuana intoxication. This reaction is more likely to occur in inexperienced users or in users who unknowingly consume more potent cannabis than expected. The symptoms usually subside over a few hours. Reports from Middle Eastern and Asian cultures in which cannabis use is more frequent and at higher dosage levels than is common in the United States have described cannabis psychosis that often lasts for 1 to 6 weeks or longer. These clinical reports, however, do not present data in a manner that would withstand rigid scrutiny. As other studies with different conclusions about the existence of a cannabis psychosis have methodological problems, it is difficult to reach a conclusion.

Marijuana flashbacks are still occasionally reported. Groups that have examined the relationship between cannabis and violence have generally concluded that the use of marijuana is not a major cause of aggression, although these studies have underemphasized individuals who may be at some special risk of violence.

The amotivational syndrome, which consists of apathy and a lack of concern or motivation over the future, has been described in populations of marijuana users. Uncontrolled reports from both the United States and areas of the world where cannabis is readily available report decreased work output and initiative in chronic cannabis users.

Tolerance--a diminished response to a repeated cannabis dose--is clearly associated with repeated use. Tolerance develops quite rapidly to many of the effects of THC. In instances in which definite tolerance develops in humans, mild physical dependence seems to be involved. However, the relationship between withdrawal symptoms and drug-seeking behavior is not simple. Drug-seeking behavior is shaped by many social, economic, psychological, and other factors. The information to determine why mild withdrawal syndromes are associated with drug-seeking behavior for many drugs is not available.

Kaplan, H.B. Deviant Behavior in Defense of Self. New York: Academic Press, 1980.

DRUG	Marijuana; multidrug
SAMPLE SIZE	7,618
SAMPLE TYPE	Junior high school students
AGE	Adolescents
SEX	Both
ETHNICITY	White; black; Mexican American
GEOGRAPHICAL AREA	Houston, Texas
METHODOLOGY	Longitudinal survey--panel
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	March and April 1971, 1972, 1973
NO. OF REFERENCES	239

PURPOSE

A general theory of deviant behavior centers on the interacting relationship between attitudes toward the self and deviant behavior. The theory considers a broad range of deviant behavior patterns both as responses to certain self-attitudes and as antecedents of changes in self-attitudes given certain conditions. The theory specifies the preconditions common to the adoption of such deviant behaviors as drug abuse, delinquency, violence, alcoholism, and suicidal behaviors. The theory is based on the premise that a basic feature of human personality development is the self-esteem motive, the personal need to maximize the experience of positive self-attitudes and to minimize the experience of negative self-attitudes. The theory also specifies that a person's failure to satisfy the self-esteem motive is determined by three sets of factors: belief that one does not have valued attributes or behaviors, belief that others do not view one positively, and the failure to use various self-protective response patterns to avoid self-devaluing effects of negative experiences. Negative self-attitudes may cause a person to adopt deviant response patterns and the consequences of these response patterns may change self-attitudes and promote continuation of the deviant patterns.

This longitudinal survey study of 11- to 13-year-old schoolchildren in Houston, Texas, was designed to test a number of the hypotheses that constitute this general theory of deviance.

METHODOLOGY

The target sample included all seventh grade students in 18 of the 36 junior high schools in the Houston Independent School District as of March 1971. Schools were chosen by a table of random numbers. The seventh grade was chosen to minimize cases of prior involvement in deviant activities and because the period between age 11 and 13 seems to be the developmental period that is most predictive of adult psychological health. Subjects were tested three times: during March or April of 1971, 1972, and 1973. A total of 7,618 usable questionnaires were returned at the time of the first survey administration. A total of 70 percent of the students also responded to either or both of the subsequent questionnaires. Respondents to the initial questionnaire were 49 percent male, 61 percent white, 28 percent black, and 11 percent Mexican American.

The test instrument was a 209-item self-administered questionnaire. Self-attitudes were measured by scores on a self-derogation scale containing seven items. Deviant behavior was measured by self-reports of deviant behavior; such behaviors included smoking marijuana, taking narcotic drugs, stealing, damaging property, being suspended or expelled from school, skipping school, and fighting. Vice principals or school counselors also completed forms regarding students' behavior. Comparison of these two sources resulted in acceptance of student self-reports as rough indicators of deviant behavior. The questionnaires also contained other variables, which were considered either as antecedents or as consequences of self-attitudes and deviant behaviors. Hypotheses were tested by means of contingency analysis, and comparison of subgroup means with significance of differences between means was generally determined by a one-tailed t-test that assumed unequal variances.

RESULTS

At the first test administration, 13.8 percent of the subjects reported having smoked marijuana; 24.5 percent had used wine, beer, or liquor more than two times; and 8.3 percent took narcotic drugs. Results concerning the self-esteem motive indicated that human beings universally seek to attain, maintain, or restore feelings of self-acceptance and seek to avoid the experience of self-rejecting attitudes. Results provided empirical support for the theory's assertion that self-attitudes are influenced by beliefs about one's own qualities, beliefs about others' views of one's qualities, and self-protective attitudes that forestall the experience of feelings of self-rejection. Levels of negative self-attitudes were linearly related to smoking marijuana, using narcotics, and engaging in a variety of other deviant behaviors. Individuals with negative self-attitudes also tended increasingly to perceive an association between their negative self-attitudes and their experiences in such membership groups as family and school. This tended to promote the adoption of deviant response patterns. Also, the deviant response patterns themselves reduced subjects' negative self-attitudes. Subjects who smoked marijuana, sold narcotic drugs, or engaged in other specific deviant behaviors showed greater reductions in self-rejection over the course of the study period than did subjects who denied performing these acts in the early period.

CONCLUSIONS

Results confirmed in a significant but limited way the usefulness of the general theory of deviant behavior, although much of the variance in self-attitudes and deviant behavior remains to be explained. Deviant response patterns were adopted by highly self-rejecting persons and the adopted deviant patterns tended to function as alternative sources of self-enhancement. Further research is need to confirm these results on the same population, to determine their generalizability, and to test untested aspects of the theory. Results are limited by the nature of the sample, the sample attrition, and other factors. Nevertheless, the theoretical structure focusing on the reciprocal relationship between self-attitudes and deviant behavior shows promise as a means for integrating existing research, providing a framework for additional testable propositions, and incorporating diverse kinds of factors related to the tendency toward and adoption of deviant behavior.

Keil, T.J. Social correlates of female abstinence from marijuana: Results of a household survey. The International Journal of the Addictions, 15(7):957-967, 1980.

DRUG	Marijuana
SAMPLE SIZE	1,037
SAMPLE TYPE	General population
AGE	Adolescents; young adults; mature adults (range: 14-65)
SEX	Females
ETHNICITY	Cross-cultural
GEOGRAPHICAL AREA	Pennsylvania
METHODOLOGY	Descriptive study; correlational study
DATA COLLECTION INSTRUMENT	Household survey
DATE(S) CONDUCTED	1976
NO. OF REFERENCES	15

PURPOSE

A major feature of 20th-century America has been the growth and institutionalization of sex-specific social worlds that limit women to certain conventional roles, as well as circumscribe their opportunities for engaging in deviant behaviors. Because of recent changes in sex role stereotypes, one can expect that marijuana use would be more common among women who have a higher social status, play multiple roles, are not active in religious organizations, and are younger. This study examines correlates of female marijuana use based on data from a 1976 household survey conducted in Pennsylvania.

METHODOLOGY

The survey was carried out by the Institute for Survey Research of Temple University and used a multistage probability sample of the eligible households in the State. An Automatic Interaction Detection Algorithm with the ranking option allowed researchers to set up a model of causal order among predictors that examined background factors such as age, ethnicity, ethnic group identification, religion, religiosity, mother's and father's drinking levels, sibling's substance use, and breadwinner's occupation when the respondent was 13. After these factors explain as much variation as possible, a second set of variables operates on the remaining unexplained variations.

The latter factors included education, occupation, family income, role involvements, subjective estimate of marijuana use among peers, and measures of self-esteem and social desirability. The sample consisted of 1,037 women between 14 and 65 years old.

RESULTS

Analysis of the data indicated that the nature and type of women's social roles exerted a strong influence on marijuana use. Only 1 percent of the women between 31 and 65 years old had used marijuana, opposed to 37 percent of the 14 to 30 age group. Women who were affiliated with more conservative Protestant denominations, the Roman Catholic Church, and Eastern or Oriental faiths had a higher percentage of abstainees than women who had no religious preference or were Jewish, Episcopalian, Unitarian, Quaker, or Protestant with no denomination specified.

Marijuana had been used at least once by 64 percent of those aged 14 to 28 who were involved in the following roles: working full time and in school; working part time and in school; unemployed, looking for work and in school; and in school and homemaker. Women who were regular church attenders and whose fathers were abstainers or light and moderate drinkers had a lower proportion of marijuana users than those whose fathers were problem drinkers or who had no fathers.

Women reporting that none of their peers used marijuana were likely to be abstainers, whereas 52 percent of those reporting peer use had used marijuana at least once. Similar patterns were found in income and education subgroups. Women completing 9 to 12 years of school had a smaller proportion of users than women with 13 to 17 years of schooling. Women identifying themselves as American Indian, English, Scottish, Welsh, Northern European, or Southern European had a lower prevalence of use than black, Irish, East European, or other groups.

CONCLUSIONS

Marijuana use is concentrated in women under age 30. Use is influenced by religious involvement, family income, peer drug use, educational level, and ethnicity.

Women participating in social networks where traditional concepts of femininity prevail are not so likely to have used marijuana as women not so positioned. As women move into social positions and situations that permit them to neutralize the social costs of engaging in deviant behavior (i.e., marijuana use), the prevalence of use will increase.

Kellam, S.G.; Ensminger, M.E.; and Simon, M.B. Mental health in first grade and teenage drug, alcohol, and cigarette use. Drug and Alcohol Dependence, 5(4):273-304, 1980.

DRUG	Marijuana; hashish; alcohol; tobacco; multidrug
SAMPLE SIZE	705
SAMPLE TYPE	High school students
AGE	Adolescents (range: 16-17)
SEX	Both
ETHNICITY	Black
GEOGRAPHICAL AREA	Chicago, Illinois
METHODOLOGY	Longitudinal survey; correlational study; secondary analysis
DATA COLLECTION INSTRUMENT	Questionnaires; school records
DATE(S) CONDUCTED	1966-67 and 1976
NO. OF REFERENCES	45

PURPOSE

This paper concerns early social adaptational and psychological antecedents of teenage drug (including marijuana), alcohol, and cigarette use in a communitywide population of 1966-67 first graders who the authors reassessed in 1976 in a 10-year followup study. The target community was Woodlawn, a poor, black neighborhood on the south side of Chicago, Illinois. The study not only provides data on predisposing factors in later drug use but also supports the view that communities differ in their drug use patterns and thus require individualized planning.

METHODOLOGY

For the long-term followup, the target population was the entire 1966-67 first grade of 1,242 students and their families. A total of 939 mothers or mother-surrogates from the original population were located and reinterviewed, and 705 agreed to participate in the reassessment. Within the adolescent sample, 345 were male and 360 female. Comparisons with others from the original population who were not reassessed indicated that no substantial differences existed except in terms of early mobility and parochial school enrollment.

In 1966-67, the Woodlawn first graders were evaluated by the Teacher's Observation of Classroom Adaptation (TOCA), the Metropolitan Readiness Test (MRT), and the Kuhlmann-Anderson IQ test. Teachers assessed their social adaptational status in standardized interviews, and mothers as well as clinicians reported on their psychological well-being. Information on teenage drug use was obtained from questionnaires completed by the 705 adolescents followed up in 1976. Black college students administered these tests to small groups of teenagers, using audiovisual aids to control for reading ability differences. This instrument also contained multi-item scales to measure self-perceptions of antisocial behavior and social involvement.

RESULTS

The former first graders, now aged 16 and 17, used beer or wine, hard liquor, marijuana or hashish, and cigarettes with considerable frequency. Psychedelics, amphetamines, barbiturates, tranquilizers, cocaine, opiates, inhalants, and codeine were used infrequently. The following characteristics observable in first grade were associated with drug use by adolescents 10 years later: (1) higher first grade IQ test scores or school readiness test scores predicted more frequent use for both sexes; (2) males used drugs and alcohol more often than females, and antecedents of later drug use were clearer for males than females; and (3) children rated by teachers as shy in first grade used drugs least often 10 years later, while those rated as aggressive used drugs most often. Adapting first graders as well as those with learning problems were moderate drug, alcohol, and cigarette users.

Higher levels of psychiatric symptoms in first grade predicted, to some extent, lower teenage drug use for females. Teenage social involvement played no role in drug use by females, but was associated with the use of beer, wine, and hard liquor by males. Males who were shy-aggressive first graders used drugs more if they became antisocial as teenagers.

CONCLUSIONS

The Woodlawn study suggests that teenage drug use in similar communities will be associated with early signs of intelligence, readiness for school, and social adaptive capacity as well as trouble with authority. The findings also indicate that drug use can be predicted by first grade shyness or aggressiveness, particularly in males. Because school peer groups are segregated by sex, females may differ in their attitudes toward shy and aggressive behaviors. While males may find shyness a barrier and aggressiveness a pathway to acceptance in large peer groups revolving around games or sports, females may find such behavior relatively unimportant to their smaller, more intimate social groups. The evidence also suggests that some psychological factor is operating in shy children that makes them avoid risks when teenagers even though they may have expanded their social contacts.

Pascale, R.; Hurd, M.; Primavera, L.H. The effects of chronic marijuana use. The Journal of Social Psychology, 110:273-283, 1980.

DRUG	Marijuana
SAMPLE SIZE	14
SAMPLE TYPE	Users and nonusers
AGE	15 to 19 years
SEX	Both
ETHNICITY	White
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Interviews; MMPI subscales; observations; Rotter Incomplete Sentences Blank
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	10

PURPOSE

Whether marijuana is detrimental to the psychological functioning of the user is a subject of much controversy. Empirical findings have been extremely inconsistent regarding marijuana's effects on personality and behavior. This study aimed to determine if chronic marijuana use affects the variables of aggression, frustration, alienation, and social and self-adjustment. It took place in a naturalistic setting in that a history of marijuana use was required for placement in the smoking group and little, except for the test administration, was done to interfere with participants' daily lifestyles. Three hypotheses were tested: (1) posttest measures will differ for those willing to stop using marijuana and those continuing drug use; (2) both pretest and posttest measures will be different for nonsmokers and for continuing smokers; and (3) both smokers and former smokers will have similar pretest scores, which will differ from those of nonsmokers; posttest scores for nonsmokers and former smokers will be the same.

METHODOLOGY

The initial group of subjects consisted of 18 middle class male and female volunteers. All subjects were white, lived at home with their parents, attended either public high school or a local

college, and ranged in age from 15 to 19. The nonsmokers control group consisted of four subjects who had not used marijuana in the past 12 months and had used it no more than three times in their lifetimes. The control smokers included eight subjects who had a history of chronic use and who planned to continue using the drug for at least the next 3 months. The experimental group consisted of six persons who were chronic smokers prior to the project's initiation but who had decided to discontinue use for a 2-month period. Chronic use meant smoking at least once a day, 6 days a week, throughout the previous year.

Test instruments included an interview, the Rotter Incomplete Sentences Blank (ISB), eight subscales of the Minnesota Multiphasic Personality Inventory (MMPI), and a behavioral measure of frustration. MMPI subscales were chosen to measure social and emotional adjustment and alienation. The ISB was designed to measure conflict or positive adjustment. Interviews varied slightly according to the group being interviewed but covered personal information, school and community activities, parental information, peer interactions, smoking habits, and attitudes about marijuana. Frustration was measured by having subjects use a buzzer to signal the experimenter in an adjacent room after estimating the passage of specified spans of time. Times were increased in stages and monetary rewards were given--larger rewards for longer waiting times. Subjects received their rewards promptly after sounding the buzzer on all but the last trial. This time, the reward was withheld for 15 minutes after the initial buzzer was sounded. During this waiting period frustration behaviors were observed and noted.

RESULTS

Three subjects from the control smokers group and one from the experimental group failed to meet all the project requirements, and their data were eliminated from the analysis. Thus, four subjects remained in the nonsmokers group, five in the smokers group, and five in the experimental group. The mean weekly rate of smoking was 11.7 marijuana cigarettes for the smokers group and 10.4 for the experimental group. Interview results showed no differences among groups in interest in community activity and peer interaction. All of the smokers and experimental subjects favored decriminalization of marijuana, while only one of the four nonsmokers favored such legislation. One-way analyses of covariance also showed no significant differences. Males were found to score significantly higher than females on the frustration scale.

CONCLUSIONS

Smokers, nonsmokers, and former smokers did not differ from each other in terms of social and emotional adjustment, alienation, aggression, or reactions to frustration. However, control of certain variables was sacrificed because of the authors' decision to study marijuana use in a real-life situation. Dosage levels were not monitored, and subjects' statements regarding drug use were not verified by other means. Nevertheless, the authors maintained contact with the subjects, emphasized honesty, and initiated contact with users' friends and acquaintances. Comparison of these findings with the literature suggests that previously indicated differences between users and nonusers may be due to the use of naive versus experienced marijuana users as subjects. The effect of marijuana may be a function of the means by which the drug is introduced. Introduction by friends in a naturalistic setting involves telling novices what to expect and assuring them that all is well, while the laboratory provides the naive subject a cold, strange environment and an entourage of unfamiliar faces. In addition, a new smoker will need to adjust to the changes in physiological and psychological functioning that marijuana induces, while the experienced user can better understand and cope with the effects of the drug.

Orive, R.M., and Gerard, H.B. Personality, attitudinal, and social correlates of drug use. The International Journal of the Addictions, 15(6):869-881, 1980.

DRUG	Marijuana; multidrug
SAMPLE SIZE	106
SAMPLE TYPE	Adolescents and young adults
AGE	14 to 22 years
SEX	Both
ETHNICITY	White; Chicano; black
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational and longitudinal
DATA COLLECTION INSTRUMENT	Interviews; questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	31

PURPOSE

Behavioral scientists have studied personality factors, the role of the peer group, and attitudes toward drugs in general to examine the rapidly growing use of illicit drugs by young people. Since 70 percent of adolescent drug users report that they had not planned to use drugs when they first tried them, it is unclear whether a positive attitude toward drugs leads to their use. The peer group is known to be the medium through which drug use spreads, but the details of its role are unclear. In addition, different studies have indicated different personality characteristics as being related to drug use.

This study's goal was to explore systematically attitude, personality, and peer influence to understand factors underlying the epidemiology of drug use. The study compared different drugs within the same population and assessed personality prior to initial drug use. Retrospective data on 106 young people collected up to 10 years prior to the present study as well as current data were analyzed to determine predictors of drug use.

METHODOLOGY

From a larger sample of respondents who took part in a prior unrelated study of personality, school achievement, and other factors, a randomly selected subsample of 106 individuals were contacted and interviewed. A total of 90 subjects were white, 9 were Chicano, and 7 were black. Respondents included 65 males and 41 females, ranging in age from 14 to 22. Interviewers were college students trained in interviewing techniques and in the use of the interview schedule. If possible, the interviewer's sex and ethnic background were matched with those of the subject. The first group of questions were designed to assess relative involvement with the peer and parent cultures by asking the respondent about involvement in different kinds of activities. The interview also included questions about the subject's source of drug knowledge, extent of drug use, and circumstances under which drug use started. Drugs about which questions were asked included cannabis, hallucinogens, stimulants, depressants, heroin and other opiates, tranquilizers, inhalants, cocaine, alcohol, and tobacco. A loop technique was used to assess separately the circumstances surrounding use of each drug. Subjects were also asked about such behaviors as skipping school, stealing money or property, using profane language in public, and destroying public property. Items asking about socially approved behaviors such as holding membership in religious groups and neutral activities such as watching television were interspersed among the delinquency items. The second part of the interview consisted of a self-administered questionnaire that included items from the Internal-External Control Scale, the Social Desirability Scale, the Four-Item F-scale, the General Anxiety Scale, and scales measuring self-attitude and perception of others' attitudes toward self.

RESULTS

About two-thirds of the subjects had used alcohol, almost half had used marijuana at least once, and about one-fifth had used hallucinogens. All those who had tried the harder drugs, such as hallucinogens and stimulants, had also tried marijuana. None of the personality measures taken in the earlier survey of the subjects were systematically related to the use of marijuana. However, anxiety and intelligence quotient (IQ) did predict hallucinogen use--users had higher IQs, scored consistently lower in anxiety on each of the earlier measurements, and tended to have lower anxiety scores on the current measures. Measures taken in earlier years that were expected to predict drug use failed to do so. The personality measures obtained in the more recent interviews also failed to show any significant relationship to drug use.

Social factors seemed to play a major role in the spread of drug use. For all drug categories, a larger number of those who had used drugs reported learning about them from peers rather than adults, whereas more nonusers reported learning from adults rather than from peers. Marijuana users and hallucinogen users both showed greater involvement with peers and less involvement with parents than nonusers. Moreover, drug users took part in delinquent behavior more than did nonusers. Heavier drug users were more approving of drug use in general, but drug use may have influenced attitudes rather than vice versa. Also, except for hallucinogen users, less than half the illicit drug users expressed attitudes favorable to drugs. A large percentage of users of each category of drugs were unsure that they were doing the right thing when they first began using drugs. In addition, high proportions of peers were reported to be using drugs when the individual began using them. Results also showed that initiation into drug use is a group phenomenon and that the recruiter for all illicit drugs and to a large extent for licit ones is typically a friend. For initial use of alcohol and, to a lesser extent, for cigarettes, relatives seemed to be the recruiters. The initiator of the adolescent into illicit drug use was not a group leader but rather an equal status peer group member. Factors in the spread of drug use followed similar patterns for licit and illicit drugs.

CONCLUSIONS

Data indicated that personality factors did not predict drug use, except for hallucinogens, where the users were more intelligent and less anxious than nonusers. Social correlates of drug use did, however, predict users and nonusers of both licit and illicit drugs. Results showed that the primary influence is the peer group. As the adolescent group tries to establish independence from parental control, behavior becomes counternormative to the expectations of adult society. Attitudinal correlates showed that the beginning user was in conflict when drug use began. A strong motive of the recruiter for any drug may be the reduction of conflict through the production of social consensus for the drug use. Results indicated that in the prediction of drug

use the situation was by far the dominant influence, and personality traits were minor influences. Other studies showing the importance of personality traits may be biased by influences that operate when use and dispositional data are collected at the same time. Alternatively, the lack of stability over time of scores used for personality measures may account for the present study's negative findings. Further research should focus on factors that make the peer group, not the individual, likely to adopt drug-using norms.

Raffoul, P.R., and Cummins, M.J. Voluntary reduction of cannabis use among graduate students. The International Journal of the Addictions, 15(5):647-656, 1980.

DRUG	Marijuana
SAMPLE SIZE	186
SAMPLE TYPE	Graduate students
AGE	Young adults, mature adults (mean: 26; range: 21 to 46)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	St. Louis, Missouri
METHODOLOGY	Descriptive study
DATA COLLECTION INSTRUMENT	Interviews; questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	9

PURPOSE

Although much research has focused on the reasons for the initiation and maintenance of marijuana use, few studies have examined the reasons associated with the voluntary reduction or discontinuance of marijuana use. The available literature has identified six specific factors associated with this reduction: health effects, approval from peers and family, availability of marijuana and money, pressures from the legal and educational institutions, personal traumas associated with marijuana use, and substitution of other behaviors or drugs more reinforcing than marijuana use.

This study uses a behaviorally specific measure of regular marijuana use to differentiate nonusers or casual users from regular users and to determine what factors were associated with the voluntary reduction or cessation of marijuana use.

METHODOLOGY

A total of 2,983 graduate students in the liberal arts and social sciences in St. Louis, Missouri, were sent screening questionnaires. Two self-report criteria were used to determine the regularity of marijuana use: (1) the availability of a personal supply and (2) a minimum frequency of

at least weekly marijuana use for at least 6 months. One-fourth of the questionnaires were returned, and 186 of the eligible subjects were contacted by telephone to arrange a personal paid interview. Interviews were conducted with 98 reducers, 44 stoppers, and 44 maintainers. Each interview lasted from 30 to 75 minutes.

RESULTS

Most of the subjects were first-year graduate students. The sample included 101 males and 85 females. The most common parental income during subjects' senior year in high school was between $20,000 and $30,000. The three study groups were similar in terms of demographic variables.

The three groups had a high frequency of polydrug use. The age of first polydrug use was significantly earlier for amphetamines and psychedelics among the stoppers than among the other groups. Maintainers used marijuana significantly more often than reducers in the week before the interview. Both reducers and maintainers used more other illicit drugs than did the stoppers, whose illicit polydrug use dropped as their marijuana use ceased. The groups were similar in their alcohol and tobacco use.

Most of the subjects began to use marijuana between the ages of 18 and 21. Stoppers tended to start using marijuana earlier than the other groups and to use significantly more marijuana than other subjects, while maintainers used the least. Stoppers were significantly more likely to share their marijuana with others; maintainers, to use marijuana alone; and reducers, to use marijuana with other people. Stoppers also reached their maximum use sooner than the other groups. Stoppers' marijuana careers were characterized by a more rapid rise and decrease, whereas maintainers and reducers had more gradual and lengthy transitions to different levels of use.

Most subjects reported health problems, social context disapproval, and the substitution of other activities as the reasons for changing their patterns of marijuana use. Neither the stoppers nor the reducers were influenced to any degree by fears of institutions, personal traumas, or the availability of money or the drug. Those who substituted other behaviors for marijuana use were more likely to discontinue marijuana use rather than to reduce it. Reducers tended to substitute school activities for marijuana use, while stoppers chose other activities outside of school. When subjects were asked to identify what drugs they enjoyed more than marijuana, stoppers tended to name alcohol while reducers more often named other illicit drugs.

CONCLUSIONS

This research is significant because it extends the career concept of drug use beyond the initiation and maintenance stages to include the terminal phase of reduction, finding that cessation of marijuana use is related to outside activities representative of general lifestyle changes rather than to the drug experience per se.

Drug use is not a simple phenomenon. A variety of careers exists among marijuana users, ranging from experimental to intransient use. The maintenance career of marijuana use appears to be similar to other types of regular drug use (i.e., use of alcohol and tobacco).

Those considering intervention into drug-taking behavior should examine this behavior's relationship to the life cycle and all personal life experiences. Educational strategies should address the total educational process, recognizing that information appropriate for one point in a life cycle may be inappropriate for other parts.

Weller, R.A., and Halikas, J.A. Objective criteria for the diagnosis of marijuana abuse. The Journal of Nervous and Mental Disease, 168(2):98-103, 1980.

DRUG	Marijuana, hashish, hash oil
SAMPLE SIZE	97
SAMPLE TYPE	Chronic users/abusers
AGE	23 to 36
SEX	Both
ETHNICITY	White
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Comparative study
DATA COLLECTION INSTRUMENT	Interviews
DATE(S) CONDUCTED	Mid 1970s
NO. OF REFERENCES	15

PURPOSE

The increasing use of marijuana in the United States makes it likely that some individuals will have problems in controlling their consumption of marijuana just as many persons now have difficulty controlling their alcohol consumption. Thus, a counterpart to the alcoholic may occur among regular marijuana users.

The existing literature does not present criteria to distinguish the marijuana abuser from the marijuana user. Using an analogy to alcohol abuse, this study developed objective criteria for marijuana abuse based not on actual amount or frequency of use but on disruptions in several life areas of the user. These criteria were then applied to a sample of 97 chronic marijuana users.

METHODOLOGY

The Washington University criteria for alcoholism were used as a model according to which four groups of potential life problems resulting from marijuana use were classified. The first group--adverse physiological and psychological drug effects--includes such adverse consequences as toxic delerium or anxiety reaction, physical health problems, blackouts, and addiction or

dependence. The category of control problems consists of the inability to stop using marijuana, attempts to limit use, early morning marijuana use, and two or more binges or benders. The grouping of social and interpersonal problems includes arrests because of behavior while high, traffic violations while intoxicated with marijuana, job problems, fighting, and loss of friends. The fourth category, adverse opinions, includes self-reports of excessive marijuana use, family objections to the amount and/or frequency of marijuana use, objections from persons to the individual's marijuana use, and guilt feelings about marijuana use.

These criteria were applied to 97 marijuana users who were being reinterviewed 5 to 6 years after they had taken part in a 1969-70 study on marijuana use. The subjects were white, self-defined as regular users, and represented all but three of the original study group. They were interviewed using a systematic structured instrument including questions regarding occurrence of the abuse criteria. The subjects were specifically asked to respond regarding only the instances in which they had been using marijuana alone and not in combination with other drugs or alcohol. It was the subject who determined whether or not marijuana had had a cause-and-effect relationship on, or was related to, an adverse event. The subjects were paid for participation and appeared to give honest answers to questions.

Although the resin and oil from Cannabis sativa were considered to be marijuana in this study, most of the subjects' experiences were with the more common marijuana preparations.

RESULTS

Nine marijuana abusers were found among the sample, including five who fulfilled the criteria for a definite diagnosis and four who had symptoms in three different categories and were probable marijuana abusers. The 9 abusers had an average of 5.6 life area problems from marijuana, whereas the 88 nonabusers averaged only 0.8 problems each. For the abusers, the most frequently reported symptoms were health problems, panic reactions or delerium, traffic violations, and use of the drug in the morning three or more times. Other notable symptoms included memory blackouts, fighting, and feelings in themselves or others that their marijuana use was excessive. Few symptoms were common to more than 5 percent of the nonabusers, and half of the nonabusers had no symptoms of life problems from their regular marijuana use.

While 42 percent of the users were women, only one abuser was female. Most of the subjects had attended college; 66 percent of the users and 44 percent of the abusers had completed a degree. One-third of the users had obatined a graduate degree, while only one abuser had. Both groups changed jobs often during the 5-year period following the original study. The groups were similar in health and income.

The groups differed in their marijuana use patterns. The abusers had begun using marijuana significantly earlier: 17.2 years versus 18.8 years. Abusers also used more marijuana than users and used it more frequently. Two-thirds of the abusers and 36 percent of the users felt that marijuana use was a meaningful aspect of their lives. Marijuana was preferred as a social intoxicant by 49 percent of the users; alcohol was preferred by 38 percent. None of the abusers preferred alcohol, and all but one preferred marijuana. A total of 44 percent of the abusers and 16 percent of the users were definite or probable alcoholics, although this difference was not statistically significant.

CONCLUSIONS

The objective criteria presented in the study offer a method for simple, prompt evaluation of potential problems arising from marijuana use. The high incidence of traffic citations as a reflection of impaired driving performance, and the frequency of fighting among the abusers are of concern. The high incidence of alcoholism in the abuser group should also be studied further. Studies to replicate these results and to examine marijuana use in relation to other problems such as psychiatric illness, alcoholism, and the abuse of other drugs are also needed.

Bachman, J., and Jones, R.T. Personality correlates of cannabis dependence. Addictive Behaviors: an International Journal, 4:361-371, 1979.

DRUG	Cannabis
SAMPLE SIZE	48 included in multiple regression analyses
SAMPLE TYPE	Heavy users
AGE	Young adults (mean: 25)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	San Francisco, California
METHODOLOGY	Correlational study; multivariate analysis
DATA COLLECTION INSTRUMENT	MMPI; Eysenck Personality Inventory; Profile of Mood States; Symptom Check List; Nurses' Observation Scale; nurses' reports; self-reports
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	30

PURPOSE

While many studies have described correlations between personality and level of cannabis use, few have focused on how personality affects subjective experiences associated with cannabis intoxication and withdrawal. Laboratory research has documented withdrawal symptoms for cannabis users that include mood changes, disturbed sleep, decreased appetite, restlessness, irritability, feverishness, nausea, and abdominal distress.

This paper explores the relationship between personality and variations in withdrawal symptoms following the abrupt cessation of prolonged cannabis administration using personality tests, self-reports, and nurses' observations.

METHODOLOGY

Researchers selected 64 healthy and cooperative males between 20 and 31 years old from 133 applicants responding to newspaper advertisements. All had used marijuana regularly for an average of 5 years; drank alcoholic beverages infrequently; and did not use hallucinogens, stimulants, opiates, or barbiturates, other than infrequently or sporadically. The subjects reported using marijuana nearly every day during the 3 months prior to the experiment. All

133 applicants completed the Minnesota Multiphasic Personality Inventory (MMPI), and 40 of the 64 subjects who eventually participated in the experiment also took the Eysenck Personality Inventory.

Withdrawal symptom data were collected and analyzed for 48 subjects, 45 of whom were maintained on the maximum dose for at least 8 days. Participants spent the entire 21- to 42-day experimental period on a general hospital's psychiatric unit. Following a baseline period of 3 to 7 days when only placebos were administered, subjects were given increasing doses of THC in gelatin capsules until a maximum amount of 30 mg every 4 hours was reached, with additional doses given to 30 subjects at noon or bedtime. The total daily amount ranged from 180 to 210 mg of THC. This amount is approximately equivalent to smoking 18 marijuana cigarettes--3 times the amount another experimenter considered to be "heavy." After THC administration, subjects were again given placebo capsules for 3 to 9 days and then discharged.

The analysis of cessation effects considered the differences in subjects' states just before and after withdrawal as well as the difference in subjects' condition before and after the entire period of THC administration. Self-reports and nurses' reports were obtained daily and recorded on the Symptom Check List, the Profile of Mood States, and the Nurses' Observation Scale for Inpatient Evaluation. To reduce the number of personality variables under consideration, 17 MMPI scale scores contributed by the applicants were factor analyzed, and individual factor scores were computed for the 48 subjects.

RESULTS

In carrying out the MMPI factor analysis, the experimenters decided to combine the data from the profiles of all 133 applicants, since the profiles were similar between the excluded and included applicants. Four factors reflecting personality dimensions accounted for 68 percent of the total variance. They included factors reflecting maladjustment and general neuroticism; psychopathology characterized by the denial of anxiety; sensation seeking; and social responsiveness, aesthetic sensitivity, and passivity.

Correlations between these data and data on the cessation effects indicated that four personality factors--neurotic introversion, a tendency not to deny anxiety, absence of sensation seeking, and openness--related positively to the intensity of cannabis abstinence symptoms. These personality variables accounted for 25 percent of the variance in the cessation effects data.

CONCLUSIONS

Subjects reported increased feelings of tension, anger, and restlessness along with insomnia and anorexia when placebos replaced the THC pills. These may have been abstinence phenomena reflecting cannabis dependence and not merely the disappearance of the drug's effect.

The MMPI factors positively related to the cessation effect (neuroticism and openness) suggest that neurotic, introverted individuals, as well as empathic and honest although neurotic men, are likely to complain about or report the symptoms of cannabis abstinence more intensely. Those MMPI factors negatively correlated with the cessation effect (denial of anxiety and sensation seeking) suggest that men who tend not to deny anxiety are likely to report strong withdrawal symptoms and individuals who tend to seek arousal and excitement may experience minimal or diminished withdrawal sensations. Thus, not all personality characteristics associated with frequent cannabis use predict greater withdrawal symptomatology. Although nurses' reports confirmed these findings, their predictive value is, at present, merely suggestive.

Belgrave, B.E.; Bird, K.D.; Chesher, G.B.; Jackson, D.M.; Lubbe, K.E.; Starmer, G.A.; and Teo, R.K.C. The effect of cannabidiol, alone and in combination with ethanol, on human performance. Psychopharmacology, 64:243-246, 1979.

DRUG	Cannabidiol, ethanol
SAMPLE SIZE	15
SAMPLE TYPE	Healthy social users of alcohol who had used marijuana
AGE	Young adults (range: 18-24; median; 20.9)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Australia
METHODOLOGY	Multivariate analysis; correlational analysis
DATA COLLECTION INSTRUMENT	Breath analysis (Alcolmeter); cognitive, perceptual, and motor function tests; physical examinations; self-reports
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	19

PURPOSE

Although THC is the main psychoactive component of cannabis, other components such as cannabidiol (CBD) have potent pharmacological activity. CBD is known to prolong barbiturate-induced anesthesia in mice and to potentiate the interactive effect of THC and phenobarbitone on the seizure threshold of mice. Studies on CBD's effects in humans have produced conflicting results. Although it appears clear that CBD has no mood-altering properties, researchers disagree as to whether CBD can influence the psychological effects of THC and other substances. This study was designed to determine whether CBD could influence the behavioral effects of ethanol in humans.

METHODOLOGY

Eleven males and four females aged 18 to 24 were paid to take part in the experiment. The subjects were all social users of alcohol and had used cannabis. The experiement was conducted on four successive weekends. The volunteers received 320 microgram/kg of CBD or placebo orally. After 1 hour, they consumed either an alcoholic beverage or a placebo. Cognitive, perceptual, and motor function tests were administered 100 minutes, 160 minutes, and 220 minutes following CBD ingestion. The tests measured standing steadiness with eyes open or closed,

visual reaction time, auditory reaction time, complex reaction time, coordination, concentration and attention on arithmetic, and word construction. They were administered in separate cubicles to reduce the interactions between subjects, who could mingle freely at other times. Subjects consumed a light lunch after the second of the three sets of tests.

Pulse rates and blood ethanol levels were determined at the midpoint of each test sequence. In addition, the subjects were asked to estimate the nature and degree of their intoxication. Factor analysis was used to assess the results.

RESULTS

No significant differences were found in blood ethanol levels of the subjects who had received either CBD and ethanol or placebo and ethanol. The subjects were also able to assess correctly when they had been given ethanol. CBD did not produce a subjective effect or an effect on the intoxication ratings produced by ethanol.

Ethanol produced a significant reduction in psychomotor coordination. No significant effects were found on reaction speeds or standing steadiness. CBD produced no demonstrable effects on these behaviors either alone or in combination with ethanol. In addition, neither CBD nor ethanol produced any significant effect on pulse rate. No adverse reactions to ethanol, CBD, or the combination were noted.

CONCLUSIONS

Findings are consistent with earlier research. While CBD produced no demonstrable effect either alone or in combination with ethanol, it is possible that CBD, THC, and ethanol all interact with one another. A study to determine the effects of various combinations of CBD, THC, CBN, and ethanol has been initiated.

Clopton, P.L.; Janowsky, D.S.; Clopton, J.M.; Judd, L.L.; and Huey, L. Marijuana and the perception of affect. Psychopharmacology (Berlin), 61(2):203-206, 1979.

DRUG	Marijuana
SAMPLE SIZE	30
SAMPLE TYPE	Volunteers
AGE	Young adults (mean age 23.7 years)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Exploratory/descriptive survey
DATA COLLECTION INSTRUMENT	Affective Sensitivity Scale; Profile of Mood States; Group Embedded Figures Test
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	21

PURPOSE

While some effort has been made to investigate the influence of marijuana on social behavior, relatively few studies have focused on the influence of marijuana on interpersonal relationships. Some findings indicate that contrary to retrospective reports of marijuana users, individuals intoxicated with marijuana become less empathetic than they are normally, as their abilities to perceive emotions in others and to use communication skills are impaired. The present study specifically evaluates the influence of marijuana on the perceptual component of empathy, exclusive of the communication skills normally required in interpersonal relationships. The hypothesis tested holds that marijuana smoking will decrease the ability to correctly perceive emotions in others.

METHODOLOGY

The sample consisted of 30 male volunteers with education levels from high school to graduate school and ranging in age from 21 to 38 years (mean 23.7). All subjects had previous marijuana smoking experience beginning 4 to 18 years before the study, and most had used other illicit drugs. The experiment was conducted in groups of four to eight subjects. Each subject was

given a small pipe containing 0.33 g of marijuana, which was smoked over a 10-minute period. On a random double-blind basis, half the sample received active marijuana containing 6 mg of delta-9-tetrahydrocannabinol and the other half received placebo marijuana.

The ability to identify the emotions present in others was assessed using the Affective Sensitivity Scale. After viewing the scale's filmed sequences of naturally occurring encounters between two or more individuals, examinees were instructed to choose the statements that best described the feelings of the individuals in each scene. Half of the 1-hour presentation was viewed by the 30 subjects before smoking placebo or active marijuana and half was viewed after smoking. Means and standard deviations were obtained for the 2 halves of the test from an independent sample of 23 female and 20 male volunteers in introductory psychology classes. These data were used to convert the raw scores to $\underline{t}$-scores so that the two halves of the test would have comparable means and variances. Each subject also completed the Profile of Mood States prior to viewing each half of the Affective Sensitivity Scale. Further, 20 subjects who equally represented the 2 groups completed the Group Embedded Figures Test after viewing each part. After smoking, each subject was asked to rate the level of intoxication.

RESULTS

The test results for drug effects were statistically significant, indicating that the active and placebo influences differed. The mean score for those who received active marijuana declined 10.2 $\underline{t}$-score points (i.e., 32 percentage points) following intoxication, while the scores of subjects smoking placebos declined an average of only 1.5 $\underline{t}$-score points after smoking the inactive substance. According to the results of the Profile of Mood States, self-reported vigor decreased significantly in the group that used marijuana. No significant variations were found in the Group Embedded Figures Test. Self-reported intoxication levels were greater for those who received active marijuana than for those in the placebo treatment group.

CONCLUSIONS

The findings are consistent with studies suggesting that marijuana decreases social interaction and empathetic communication. Marijuana's effect on short-term memory, cognition, and perhaps on motivation may be responsible for the observed decline in emotional sensitivity. Further study is required to determine whether the effects are magnified with larger doses and whether similar effects are evident in actual conversations.

Dawley, H.H.; Winstead, D.K.; Baxter, A.S.; and Gay, J.R. An attitude survey of the effects of marijuana on sexual enjoyment. Journal of Clinical Psychology, 35(1):212-217, 1979.

DRUG	Marijuana
SAMPLE SIZE	84
SAMPLE TYPE	Medical students
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Exploratory/descriptive survey
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	16

PURPOSE

One of the persistent questions related to marijuana use is that of its effect on sexual performance and enjoyment. Although marijuana has long been rumored to act as an aphrodisiac, little systematic research has been directed to this area. Nevertheless, there are several accounts of an enhancement of sexual pleasure as an effect of marijuana usage. This study is an assessment of attitudes with regard to the effects of marijuana on sexual excitement.

METHODOLOGY

Subjects were 84 graduate medical students. A 57-item multiple-choice and true-false questionnaire was developed to determine the attitudes of these individuals with regard to sexual behavior and marijuana usage, as well as the actuarial characteristics of the sample. Included among these questions were 15 Lie-scale items from the Minnesota Multiphasic Personality Inventory, used as a rough validity check of the responses. Of the 84 students, 51 percent were between the ages of 24 and 28, 44 percent were between the ages of 19 and 23, 4 percent were above 28, and 1 percent below 18 years of age. A total of 78 percent of the respondents were male and 22 percent female.

Individuals who had participated in sexual activity while under the influence of marijuana were asked to complete the questionnaire with respect to their personal experiences. Those without such experience were asked to answer the questions in terms of what they thought would be the relationship between marijuana and sexual activity. Subjects who scored about 11 on the Lie-scale questions and those who neglected to note whether they were experienced marijuana users were omitted. Eleven questionnaires were eliminated for these reasons.

RESULTS

A majority of the sample (59 of 84) reported that they had smoked at least once, but most of these smokers also reported their use as less than 15 times. Of those surveyed 39 percent reported that they had engaged in sexual intercourse while under the influence of marijuana. Of the remainder of the sample, 26 were smokers and 25 were nonsmokers.

Experienced smokers held the most positive views on the pleasure-enhancing effects of marijuana. Marijuana was seen as increasing sexual pleasures and sensations as well as the intensity of orgasm. Most of this group (61 percent) considered marijuana an aphrodisiac. Nonexperienced smokers differed only slightly in their ideas about how marijuana would influence sexual behavior. They felt marijuana increased plesaure and sensations associated with sexual intercourse but did not consider marijuana to be an aphrodisiac. Nonsmokers also did not consider marijuana to be an aphrodisiac, while conceding the drug's pleasure-enhancing properties.

When the total sample is considered, highest percentages of positive responses are seen in those items pertaining to increased pleasure, sexual sensations, and intensity of orgasms as well as increasing variety of sexual experiences. Also, 45 percent viewed marijuana as an aphrodisiac and 44 percent disagreed, and few respondents felt that marijuana would decrease pleasure or have deleterious effects.

CONCLUSIONS

Enthusiasm for marijuana as an agent that enhances sexual pleasure was most prominent in the group of experienced smokers, with the nonexperienced smokers and nonsmokers following in that order. There are two possible explanations for these findings. The first is that smokers are more inhibited or sexually conflicted and that cannabis use is directed at lessening inhibitions, decreasing anxiety, and/or repressing conflicts. Thus, marijuana use at the time of a sexual encounter may be viewed as an individual's attempt to cope with the stress of the situation. An alternate explanation is that marijuana enhances sexual pleasure by a direct euphorogenic mechanism. The active constituents of marijuana may produce a unique effect on the activity of brain cells associated with pleasureable feelings. Further research is necessary before any definitive answers are available.

Georgotas, A., and Zeidenberg, P. Observations on the effects of four weeks of heavy marihuana smoking on group interaction and individual behavior. Comprehensive Psychiatry, 20(5):427-432, 1979.

DRUG	Marijuana
SAMPLE SIZE	5
SAMPLE TYPE	Marijuana users
AGE	20 to 26 years
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Clinical observation
DATA COLLECTION INSTRUMENT	Observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	17

PURPOSE

Many studies and discussions have focused on marijuana's effects on social behavior and individual behavior. Studies of social behavior have generally used one of three approaches: psychometric measures in neutral settings, use of a simulated social atmosphere, and retrospective questionnaire evaluations. The present study involved ongoing examination of chronic heavy marijuana smoking in a convivial group of healthy volunteers. The study's goal was to determine marijuana's effects on group interaction and individual behavior.

METHODOLOGY

This inpatient study involved five male marijuana users aged 20 to 26 who had smoked marijuana intermittently for many years. An experienced psychiatrist considered all the subjects free from significant psychiatric illness, and an internist used physical screening and laboratory tests to rule out physical illnesses. Participants were permitted no medication or alcohol during the study but were allowed to smoke tobacco cigarettes. They were restricted to a locked ward and were able to leave only when accompanied by a staff member.

In the first of the study's three periods, no drug use was allowed for 4 weeks to remove any preadmission drug effects. During the 4-week smoking period, participants started with 1 marijuana cigarette on the first day and doubled the number of cigarettes every other day up to 10 cigarettes, after which they could smoke ad libitum. Participants were asked to smoke the cigarettes as completely as possible; unsmoked portions were weighed. Each cigarette contained 20 mg of delta-9-tetrahydrocannabinol (THC). Subjects were given psychometric tests designed to assess THC's effects on a variety of parameters, including speech, memory, and thermal perception, and they were also given regular psychomotor tests. Weekly blood and semen samples were also taken. The final 4-week period of the study was drug free in order to remove any residual drug effects.

Participants gathered in weekly group sessions throughout the study. A psychiatrist was the group leader. By mutual agreement, group proceedings were tape recorded. The group's major purpose was perception and alleviation of personal and interpersonal stresses that might develop during the study. The effects of the stresses caused by the physically restrictive nature of the study were observed in relation to a variety of group phenomena.

RESULTS

During the presmoking period, no unusual behavior or performance was noticed. Subjects took part willingly in the tests and ward activities and were pleased with the idea of group meetings. They behaved independently of one another in the first few sessions and were primarily concerned with issues related to the study. Participants became more anxious and even somewhat paranoid as the smoking period approached. They became concerned about the purity of the marijuana cigarettes and thought that the Central Intelligence Agency might be involved in the study. They agreed that their reasons for taking part in the study involved curiosity about marijuana's effects, the $500 payment for participation, and their state of unemployment.

During the first 2 weeks of the smoking period, participants became more interactive, more communicative, and more intimate with one another. As smoking increased in the final 2 weeks they became "spaced out" and paid little attention to their surroundings. They found the marijuana to be inferior to what it had been at the start and felt unable to reach certain stages of altered consciousness when stoned. Subjectively, they reported feeling more cooperative and open to one another and felt that their awareness had been increased. These subjective reports contradicted the researchers' objective measurement of cognitive function. During the last 2 weeks of the study period most subjects became apathetic, uneasy while being tested, artificial, controlled, and often paranoid when watched by outsiders when smoking. At the middle of the smoking period they decided to smoke during group sessions but objected to taping of the sessions, fearing that the CIA might have access to the tapes. As the end of the smoking period approached, subjects became less communicative and preferred to spend more time in their rooms, quite isolated and withdrawn. They appeared moderately depressed, apathetic, and impaired in concentration. They felt that the need to communicate became less important but that their ability to communicate was amplified.

During the first week of the postsmoking period, the subjects became irritable, uncooperative, resistant, and at times hostile. They made demands and refused to participate in certain tests. Their desire for food dropped dramatically and they had serious sleeping difficulties. In the final 3 weeks, they became less irritable and tense and more cooperative. They began to feel positive toward the group sessions.

CONCLUSIONS

Subjects began having mild referential feelings as confinement continued, even before smoking began. Therefore, it cannot be stated unequivocally whether the marked referentiality observed during the smoking period was a drug effect or an effect of continued confinement. However, the abatement of the symptoms when smoking ceased, despite continued confinement, argues in favor of a drug effect. In addition, results indicate marked discrepancy between observer ratings and subject ratings. Consequently, the development of improved mood assessment scales is recommended.

Horowitz, J.D., and Goble, A.J. Drugs and impaired male sexual function. Drugs, 18(3):206-217, 1979.

DRUG	General
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Male
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Laboratory/clinical statistics
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	32

PURPOSE

Although the factors known to lead to impaired male sexual function have not changed significantly in recent years, the trend toward freer discussion of sexual matters and changed general views of sexual norms have probably contributed to an increase in males' willingness to seek treatment for inadequate sexual function. This review examines the role of drugs and drug therapy in producing sexual dysfunction in males.

SUMMARY

Normal male sexual function depends on the complex interaction of neurogenic, hormonal, and vascular mechanisms. Knowledge is incomplete regarding these factors' exact nature and relative importance. Physiological mechanisms include neurogenic/psychogenic mechanisms controlling penile erection and emission of semen, vascular mechanisms involved in the actual process of penile erection, and hormonal mechanisms related to testosterone and other sex steriods. While impaired male sexual function may take the form of reduced libido, erectile impotence, failure of ejaculation, or a combination of these, by far the most common presenting symptom is impotence. Although psychogenic factors play a major role in the majority of cases of male sexual

dysfunction, the relative roles of psychiatric and organic factors are difficult to determine. The common problem of sexual dysfunction in alcoholics illustrates the interplay of organic and psychiatric factors. Clinicians should be aware of possible impaired sexual function in any patient but especially in those at particular risk. A physical examination is necessary to rule out organic causes of sexual dysfunction. Specialized tests may include endocrine tests and penile plethysmography.

The possibility that drugs are impairing sexual function is usually only considered when a patient experiences impotence or decreased libido possibly associated with medication. The medical literature contains many case reports of drug-induced male sexual dysfunctions. However, these reports are difficult to evaluate because of the frequency of other factors of potential importance. Use of controlled trials using placebos also presents many potential difficulties.

Excessive or long-term alcohol ingestion results in a high incidence of impaired sexual performance. Only about half of the impotent alcoholics who seek treatment show any improvement in sexual function after prolonged abstinence from alcohol, and no other treatment measures have been shown to improve prognosis. The initial effects on sexual function of ingestion of opiates remain controversial. Long-term use and physical dependence are usually associated with a marked reduction in male sexual activity, even when the individual changes to methadone. Narcotic addicts and those on methadone maintenance often have low serum testosterone levels and a possible decrease in gonadotropin release, which suggests a possible hypothalamic-pituitary basis for the problem.

Use of cannabis in its various forms is popularly believed to lead to an increase in sexual interest and activity. Although the effects of cannabis on reducing inhibitions might produce this postulated effect, it is difficult to separate the drug's effect from the effects of the environment in which it is commonly consumed. The literature also contains one report of impotence, oligospermia, and reduced serum testosterone levels in young men who are chronic users of cannabis. Other drugs with which impaired sexual function have been associated include antihypertensive drugs, drugs increasing prolactin secretion, and drugs with anticholinergic effects.

CONCLUSIONS

An analysis of the drugs most frequently associated with impairment of male sexual function (i.e., alcohol, opiates, cannabis, etc.) may help the clinician anticipate the possibility of adverse effects with any particular drug. This is particularly important considering the incidence of impotence among males.

Janowsky, D.S.; Clopton, P.L.; Leichner, P.P.; Abrams, A.A.; Judd, L.L.; and Pechnick, R. Interpersonal effects of marijuana. A model for the study of interpersonal psychopharmacology. Archives of General Psychiatry, 36(7):781-785, 1979.

DRUG	Marijuana
SAMPLE SIZE	20 dyads
SAMPLE TYPE	Users and partners
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Barrett-Lennard Relationship Inventory; Zuckerman Affective Adjective Checklist; Subjective High Assessment Scale; Raskin Empathy Scale
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	16

PURPOSE

Although much marijuana research has focused on marijuana's effects on the user, little research has focused on marijuana's influence on interpersonal relationships. In groups, marijuana-intoxicated subjects show elation, euphoria, and laughter; a reduced tendency to show anger; reduced hostility but increased sarcasm; and suppressed social interactions. Information provided by marijuana users has supported the view that marijuana smoking is associated with increased caring, concern, warmth, interpersonal sensitivity, compassion, and closeness. Research on counselor effectiveness has isolated certain traits that positively influence the quality of interpersonal relationships. These traits include empathy, positive regard (warmth), unconditionality (acceptance), and congruence (genuineness). The present study was designed to test the effects of marijuana intoxication on these interpersonal skills. The dyadic relationship was chosen as a model interpersonal interaction system.

METHODOLOGY

Twenty male experimental subjects were used. All were employed in the mental health field, and all reported that they were experienced marijuana users. Initial marijuana use occurred from 3

to 12 years prior to the study (mean, 8.3 years) and current use ranged from once a month to daily use (mean, 11.9 days per month). Twenty normal females volunteered to serve as partners in the experiment. Study subjects' mean age was 28.6 years; partners' mean age was 25.5 years. Subjects and partners were strangers. Under normal, placebo, and active marijuana conditions, male experimental subjects interviewed normal female partners regarding difficult times in their lives. The active substance contained 6 mg of delta-9-tetrahydrocannabinol (THC), a dose well within the normal social range. A double-blind, counterbalanced design was followed in administering the active and placebo marijuana. Experimental subjects and their partners were told that the marijuana was supplied in different strengths, ranging from a placebo to a strong social dose.

The quality of each subject's interpersonal skills was assessed by the subject and his partner immediately after each interview. These assessments were made using a condensed version of the Barrett-Lennard Relationship Inventory. The experimental subjects and their partners also evaluated their own moods using the Zuckerman Affective Adjective Checklist, which yields scores for anxiety, hostility, and depression. Experimental subjects also evaluated their "high" using a preliminary version of a Subjective High Assessment Scale. Two trained judges evaluated 5-minute segments from the videotape of each interview. Each segment was rated for empathy using the Raskin Empathy Scale. The segments were rated in random order and the judges were unaware of the experimental conditions associated with each segment. The interrater reliability coefficient for the judges' ratings was .86. Analyses of variance, binomial probabilities, and Pearsonian correlation coefficients were used to analyze the data.

RESULTS

Experimental subjects' ratings of themselves showed a significant decrease on the congruence (genuineness) dimension during marijuana intoxication. The judges' ratings showed significant decreases in empathy during marijuana intoxication. Partners' ratings of their interviewers also showed a decrease associated with the interview in which the experimental subject was intoxicated. This effect was significant for the congruence and total score dimensions. The observed decrease in total score occurred mainly in experimental subjects who received active marijuana during the first trial. Separate analyses of the first and second trials showed that active marijuana intoxication in the first trial produced decreased scores in unconditionality and in the total scores, while intoxication in the second trial produced a significant decrease in the congruence dimension. Although the mean ratings of the experimental subjects' interpersonal skills were generally lower in the marijuana-intoxicated interviews, the ratings of some individuals substantially increased after intoxication. Analysis of the mood scores showed a significant drug effect for the partners' anxiety scores and that changes in subjects' hostility and anxiety scores correlated inversely with the subjects' total scores on the Barrett-Lennard Relationship Inventory. This relationship also existed for changes in depression during the active marijuana trial but not during the placebo trial. Adjectives from the Affective Adjective Checklist suggested elation and insecurity in the experimental subjects and dysphoria in the partners. Subjective High Assessment Scale items indicated confusion, withdrawal, and unusual feelings in the subjects. Changes in the moods of the experimental subjects were more positively related to the changes in moods of their partners during the placebo interviews than during the interviews in which the experimental subject was intoxicated with marijuana.

CONCLUSIONS

Results indicated that marijuana intoxication generally leads to a significant decrease in interpersonal skills. Subjects whose skills decreased the most became confused easily and had obvious difficulty following conversations. A few subjects became afunctional as interviewers. Subjects who improved in their interpersonal skills after administration of active marijuana became more communicative, more outgoing, and less defensive during the active-marijuana interview. The extent of the effect on interpersonal skills is difficult to infer from the statistical data presented. However, effect on the judges' ratings was similar in magnitude to the difference between high and low levels of interpersonal skills. Reduced similarities in subjects and partners' moods during intoxication may also reflect a reduction in interpersonal skills. Results also suggested that interaction with an individual intoxicated with marijuana may cause a relative increase in one's level of anxiety. Results all pointed to a deterioration in some aspects of interpersonal relationships during marijuana intoxication. Results were consistent with other studies' findings regarding mood changes, although subjects' mood changes were not consistently influenced by marijuana intoxication.

Findings appeared to contradict some marijuana users' opinions that the use of marijuana consistently leads to increases in warmth, interpersonal sensitivity, caring, and empathy. Investigations of marijuana's influence on perceptual ability may help explain this discrepancy. Findings also indicated that marijuana may in part cause inadequate socialization and adjustment. Results are limited by the study's experimental nature, the lack of testing for sex differences, and other factors. Despite these limitations, results indicated that marijuana can alter interpersonal skills and/or the quality of interpersonal relationships. These influences may have considerable effects on friendships, marriages, and professional relationships. Since most people who take psychoactive drugs continue to interact interpersonally, the effect of a drug on interpersonal interactions may be of much importance. Studies of effects of commonly used psychoactive drugs are recommended.

Jessor, R. Marihuana: A review of recent psychosocial research. In: DuPont, R.L.; Goldstein, A.; and O'Donnell, J.A.; eds. Handbook on Drug Abuse. Rockville, Md.: National Institute on Drug Abuse, 1979. Pp. 337-355.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	1973-1978
NO. OF REFERENCES	109

PURPOSE

The study seeks to present the main findings of research on marijuana use conducted in the 5-year period prior to 1978. The focus is selective and illustrative rather than exhaustive and has been narrowed primarily to the psychosocial research domain.

SUMMARY

Recent literature exhibits a shift to national probability samples representative of important population segments and toward a differentiated assessment of marijuana use behavior. An increasingly complex network of explanatory variables has been used to place marijuana use in the context of a larger pattern of behavioral adaptation to life situations and to explore its commonalities with other forms of socially structured action. At the same time, studies that extend over time and that rely on a longitudinal design have become increasingly common. Finally, research procedures have become more sophisticated, so that matched control groups, cohort-sequential design, and multivariate analytic techniques have come into use.

Nationwide surveys have shown that marijuana is the most widely used of the illicit drugs, that the prevalence of marijuana use is continuing to increase, and that a substantial proportion of the population has had some experience with marijuana. Prevalence of use is especially high for the 18- to 25-year-old age group, for males, for the Northeast and West, for large metropolitan areas, for whites, and for higher education levels. Initiation into marijuana use is taking place earlier, daily use has increased, and a large number of people, students in particular, favor legalization. In general, marijuana use has become embedded in American culture. Its institutionalization is reflected not only in the broad pattern of availability and use but also in the supportive social definitions that are increasingly shared about its nature and its function. Further, certain social or geographic locations may have more than the average influence on cultural change; thus, areas where marijuana use is quite high (e.g., metropolitan universities) or is widely accepted (e.g., San Francisco's Bay Area) may have considerable impact on future trends toward acculturation of marijuana use in our society.

Variation in marijuana use is less sharply patterned than in the past by attributes of the sociodemographic environment. Although such attributes remain significant, trends over time suggest that their role is a diminishing one. The crucial environmental factors are those relating to social interaction. The key role played by friendship patterns and interpersonal relations in providing access to marijuana, models for using it, and social support for use have been affirmed in a host of studies. Variation in marijuana use has likewise been linked to parental strictness and controls, parental support and affection, and parental conventionality.

Recent research has established coherent and systematic linkages between aspects of personality and variation in marijuana use. For example, users of marijuana differ from nonusers on a cluster of attributes reflecting nonconventionality, nontraditionality, or nonconformity. Users tend to be more open to experiences; more esthetically oriented; and more interested in creativity, play, novelty, or spontaneity than nonusers. In addition, marijuana use is associated not only with a lower value placed on achievement but with lower expectations of being able to gain achievement satisfaction. Marijuana can thus be a response to frustration, to the perception of blocked access to valued goals, and to anticipation of failure. Intense involvement with marijuana is associated with a critical attitude toward society and its institutions for both sexes in both high school and college. However, no connection has been found between marijuana use and maladjustment or psychopathology. Finally, as social definitions change and as marijuana becomes a normatively employed recreational drug, the personality factors affecting use may also change.

Marijuana use, far from being an isolated behavior, is generally part of a larger behavioral pattern involving the use of other drugs and a variety of unconventional or nonconforming actions, such as delinquency, sexual experience, political activism, and attenuated academic experience. Marijuana has emerged as a boundary drug between licit drugs like tobacco and alcohol and other illicit drugs. The linkage of marijuana use to the exploration of other illicit drugs seems best explained as part of a behavioral syndrome of nonconformity related to a common set of social and psychological factors that represent proneness to deviance or problem behavior.

Longitudinal studies have revealed that marijuana use is an integral aspect of youthful development in contemporary American society. Onset of marijuana use in samples of youthful nonusers is a predictable phenomenon based on social, psychological, and behavioral characteristics that are temporally antecedent to its occurrence. A key predictor in analyses has been the rebelliousness scale, a measure of nonconventionality of personality. Marijuana use is considered an age-graded, transition-marking behavior, and change in marijuana behavior can be seen as part of a larger pattern of simultaneous developmental change.

CONCLUSIONS

Marijuana use will probably continue to increase in prevalence in American society, not only among young people but in other age groups as well. For this reason research should be expanded on acute and chronic negative effects of use, as well as on positive outcomes of use. Research on the ethnography of marijuana use would be relevant to development of alternative use patterns more insulated against excessive or abusive practices. Research should also be conducted on reasons for discontinuing marijuana use and on the role of personal controls in regulating marijuana use. The real problem with regard to marijuana has been transformed from concern with its use to concern with its abuse. However, the illicit status of marijuana constitutes an almost impenetrable barrier to educational and intervention efforts aimed at promoting moderate use and at forestalling abusive practices. Action to separate marijuana from the other

illicit drugs would permit a shift from an unsuccessful policy of prohibition to a policy of regulation that might have greater success in minimizing marijuana abuse.

Miranne, A.C. Marihuana use and achievement orientations of college students. Journal of Health and Social Behavior, 20:194-199, 1979.

DRUG	Marijuana
SAMPLE SIZE	766
SAMPLE TYPE	College students
AGE	18 to 23 years
SEX	Both
ETHNICITY	White; other
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Fall 1975
NO. OF REFERENCES	26

PURPOSE

Literature relating to the effects of marijuana use on the academic achievement of college students has produced contradictory results. The present study attempts to assess the relationship between marijuana use and various achievement indicators within the context of a multivariate design. Since both marijuana use and achievement have been found to be significantly related to factors such as parents' socioeconomic status and individuals' sex, religious affiliation, religiosity, and family structure, the relation between marijuana use and achievement orientation is estimated, while these other relevant factors are held constant.

METHODOLOGY

Questionnaire were administered in fall of 1975 to all sections of the introductory sociology course at a large southwestern university. The final sample consisted of 776 students. The majority of the respondents were female (63 percent), came from urban residential areas (91 percent), were white (86 percent), were between the ages of 18 and 23 (94 percent), and were generally from middle class backgrounds.

Materialistic achievement orientation was measured by a six-item Likert-type scale that assessed the importance to the individual of acquiring material goods. Achievement values were measured with a seven-item Likert-type scale that assessed the basic elements of the achievement syndrome described by Rosen. Occupational primacy was measured with a six-item Likert-type scale developed by Kahl and Davis that assessed the importance of occupational success relative to alternative activities, such as leisure-time activities. Educational aspirations were measured by a questionnaire item that asked respondents how much education they hoped to attain. Academic performance was measured by self-reports of high school and college grades, and occupational aspirations were measured by a questionnaire item similar in structure to that used for educational aspirations. Responses were coded according to Duncan's socioeconomic index for all occupations. Parents' educational background, fathers' education, religious affiliation, sex, parents' marital status, and religiosity were all determined by students' self-reports. Bivariate contrast tests were used to assess the relationships between marijuana use and the various indicators of achievement when other factors were not considered.

RESULTS

A significant relation was found on three of the six tests: materialistic achievement orientation, occupational primacy, and achievement values. As the frequency of marijuana use increases, materialistic orientation decreases. Similarly, as frequency of marijuana use increases, the relative importance of occupational success decreases. Surprisingly, a bivariate contrast test reveals a statistically significant quadratic relationship between frequency of marijuana use and achievement values. As marijuana use increases from "never use" to "once a week," achievement values likewise increase. However, when marijuana use goes beyond once a week, achievement values drop dramatically. However, multivariate analysis of variance design shows that marijuana use cannot explain a significant amount of the variation in any of the indices of achievement when other relevant factors are held constant.

Interaction effect analysis points to a tendency among males but not females for materialistic orientation and occupational primacy to decrease as marijuana use increases. Furthermore, only among Protestants does occupational primacy decrease as marijuana use increases. Finally, among subjects from broken homes, Catholics score highest on occupational primacy, followed by Protestants, Jews, and lastly, atheists or agnostics. Among subjects with intact families, Protestants score the highest on occupational primacy, followed by Catholics, Jews, and atheists or agnostics.

CONCLUSIONS

For the college population tested, none of the six indicators of achievement is significantly related to marijuana use when the effects of other significant variables are controlled. Furthermore, the fact that initial relationships found with a bivariate test of contrast failed to appear in a multivariate design calls into question the findings of studies that have not taken into consideration other relevant variables in their analysis of the relation between achievement and marijuana use.

Natale, M.; Zeidenberg, P.; and Jaffe, J. Delta-9-tetrahydrocannibinol: Acute effects on defensive and primary-process language. The International Journal of the Addictions, 14(7):877-889, 1979.

DRUG	THC
SAMPLE SIZE	4
SAMPLE TYPE	Psychiatric institute staff residents (volunteers)
AGE	Young adults (range: 25 to 29)
SEX	Males
ETHNICITY	Not specified
GEOGRAPHICAL AREA	New York
METHODOLOGY	Multivariate analysis; secondary analysis
DATA COLLECTION INSTRUMENT	Monologue; memory test; thermal task; clinical observations; interviews
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	15

PURPOSE

Several studies have focused on marijuana's effects on speech as a way of measuring changes in thought processes induced by marijuana intoxication. This research indicates that although THC may affect primary-process thinking (timelessness, incongruous ideas), it does not affect the content (anxiety, hostility, etc.).

The study examines the effects of THC on defensive, primary-process, and secondary-process language.

METHODOLOGY

The four volunteers for the study were male staff members of the New York State Psychiatric Institute and were 25 to 29 years old. The study used a double-blind procedure and took place in a guest apartment at the institute.

The subjects were given psychological and medical screening tests prior to the experiment. They were then given a placebo, followed by 30 minutes of interviews and clinical observation. They next completed a round of testing consisting of a 5-minute monologue, a memory test, and a

thermal task. The testing was interspersed with clinical interviews and observations. The monologue was on any subject of the volunteer's choice and was tape recorded.

Following the first round of testing, subjects received 15 mg of THC. The second round of testing began at the onset of the drug effect, which occurred from 1 to 1.5 hours after administration of the drug. The third round of testing began 1.5 hours after the completion of the second round. By this time, the subjective sensations associated with the drug had largely passed or diminished.

Eight categories of speech were measured to indicate the presence of psychological defense mechanisms: nonpersonal references, negators, qualifiers, retractors, explaining words or phrases, expressions of feeling, direct references, and evaluators. Words indicating drive, sensation, defensive symbols, regressive cognition, and "Icarus" characteristics such as height and depth were counted to measure the use of primary-process language. Secondary-process language consisted of words in the categories of abstract thought, social behavior, temporal reference, instrumental behavior, restraint, order, and moral imperative. The word categories of emotion, male, and female were also analyzed.

The hypotheses that THC would reduce the use of defensive speech patterns as well as the use of secondary-process language were tested.

RESULTS

After the acute administration of THC, the subjects spoke more often about themselves or people known to them, and nonpersonal references decreased. The subjects were also less likely to explain their own statements or to retract previous statements. Primary-process language was not affected by THC, while the use of secondary-process language was increased.

CONCLUSIONS

Marijuana inhibits defensive speech habits. However, this is not accompanied by an increase in primary-process language (e.g., sex, emotions, etc.). Thus, marijuana does not affect the expression of unconscious or emotional content but does affect the manner of communicating (defensive speech). Contrary to expectations, secondary-process language (e.g., abstract thought) increased in relation to THC, indicating that marijuana causes people to be less defensive in their manner of communicating and to introspect or intellectualize.

Thus, cannabis may aid the psychotherapy of neurotics who ramble and do not focus on any particular aspect of their unhappiness. THC can help an individual talk in a direct manner and have a more restricted focus.

Future research should determine whether THC's effect on verbal defenses is transferable to the analytic situation and whether the effect is state dependent.

O'Donnell, J., and Clayton, R. Determinants of early marijuana use. In: Beschner, G.M., and Friedman, A.S., eds. Youth Drug Abuse. Lexington, Mass.: Lexington Books, 1979. Pp. 63-110.

DRUG	Marijuana
SAMPLE SIZE	2,804
SAMPLE TYPE	Black versus white
AGE	Young adults
SEX	Male
ETHNICITY	White; black; other
GEOGRAPHICAL AREA	United States
METHODOLOGY	Survey--correlational, comparative
DATA COLLECTION INSTRUMENT	Interviews
DATE(S) CONDUCTED	1974
NO. OF REFERENCES	41

PURPOSE

Marijuana is usually the first illicit drug used as well as the one used by most people. For example, in the National Youth Polydrug Study marijuana was used by 90 percent of both males and females, while no other drug except alcohol was used by more than half of either sex. Numerous studies have indicated that an understanding of marijuana use is important not only because of current interest in marijuana, but also because this understanding is likely to apply to other and more serious forms of drug use. Moreover, studies show a strong association between marijuana use and later use of other drugs; this connection may not be causal, but it can at least be used for predictive purposes.

Age at first use of marijuana is a strategically important variable because it is easily measured; it is potentially available prior to the occurrence of the behaviors one would like to predict; and it is strongly associated with both the fact and extent of later use of other drugs, including opiates or heroin. It is also strongly associated with drug sales and criminal behavior. This research seeks to explain the age at first use of marijuana in terms of numerous variables related to early behavior, family influences, peer influences, perceptions of drug availability, and labeling by others as a potential delinquent.

METHODOLOGY

Two sets of data were used for the analysis. The first was obtained by interviews with a nationwide probability sample of young American men aged 20 through 30 years in 1974. The sample was drawn from Selective Service records, and 2,510 subjects were interviewed. Interview items focused on drug use and its correlates; few items related to early life experiences that might be seen as predictors or causes of later drug use. A second sample was drawn from areas in Manhattan, New York City, that had been identified as areas of high drug use by reports to the City Registry in the late 1960s. A total of 294 interviews were completed. Forty-one variables prior in time to marijuana use were used for control in the New York sample, while 32 such variables were used in the national sample. Data from both samples were used to establish the relevance of age of first use as an important variable; data from the New York sample were used to examine predictors of the age at first use of marijuana.

Predictors included family influence variables (family control, closeness to mother, closeness to father, communication with parents, and father as a model), peer influences (peer delinquency, peer drug use), school adjustment, labeling, respondent's early behavior (conventional activities, early deviant behavior), and perceived availability of drugs. Items were retrospective responses concerning the period from age 13 to age 15. Variables were all ordinal measures. Data were analyzed separately for blacks and whites. Two path models predicting age at first drug use were constructed. To construct the models the 12 predictor variables were combined into 6 predictor variables. Correlation and multiple regression were used to analyze the data.

RESULTS

A much higher proportion of men in the New York sample than in the national sample had used marijuana, and the New Yorkers started use earlier. Moreover, the use of marijuana is associated with use of other drugs, although the older the subjects were when they began using marijuana, the less likely they were to use other drugs, and those who never used marijuana were least likely to use other drugs or to use them extensively. Conversely, the earlier the subjects began to use marijuana, the greater the likelihood that they would use other drugs and that their use would be extensive. Overall, three behaviors are associated with age at first use of marijuana: use of drugs other than tobacco, alcohol, and marijuana; drug sales; and crime.

Findings showed that blacks and whites had different paths to drug use in New York City in the late 1960s and early 1970s. A major explanatory variable for both groups was perception of drug availability. This variable was more centrally important for whites than for blacks in that it acted as a filter through which most of the other variables acted on age at first use. For blacks, these other variables had additional direct or indirect paths. Blacks scored much higher than whites on perception of drug availability; data indicated that this probably occurred because both delinquency and drug use were higher and more closely associated for the blacks in the sample. Family influence seemed to be more effective among the whites than among the blacks in preventing or delaying marijuana use, while peer influence and early deviant behavior by the respondent seemed to have stronger effects on blacks in leading to marijuana use or to earlier use of marijuana. These differences must be discounted to some extent because the model for blacks accounts for more variance in the dependent variable than does the model for whites.

CONCLUSIONS

Results suggest that marijuana use was more prevalent and more visible in black neighborhoods than in white neighborhoods, especially in the sense that it existed in more social networks. In addition, whites were less exposed to delinquency, which was more closely correlated with marijuana use and age at first use among blacks than among whites. Overall, the road to drug use is not the same for blacks and whites, and the data provide some indications of the sources of the differences. The models are partially unsatisfactory, however, in that the dependent variable was specific while the independent variables were too abstract to be of much value for prediction. Further studies should break the composite variables down into specific components, should focus on the concept of the perception of drug availability, and should ask about friends' use of drugs over a range of years. Results also indicate that findings may well be transferable to some extent to heroin use. Several other studies related to the prediction of adolescent marijuana use produced results consistent with this paper's findings and suggestions.

Pihl, R.O.; Shea, D.; and Costa, L. Dimensions of the subjective marijuana experience. The International Journal of the Addictions, 14(1):63-71, 1979.

DRUG	Marijuana
SAMPLE SIZE	97
SAMPLE TYPE	Volunteers
AGE	18 to 35 years
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Montreal, Canada
METHODOLOGY	Exploratory/descriptive survey
DATA COLLECTION INSTRUMENT	Drug History Questionnaire; Marijuana Effects Questionnaire
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	7

PURPOSE

Recent research suggests that demographic and cultural variables influence the pharmacological effects of cannabis and may themselves act as a subjective component of the marijuana intoxicated state. The present study seeks to define similarities and differences in the marijuana intoxication state of a specific population, considering variations in cultural milieus and time factors.

METHODOLOGY

Study subjects were 91 male volunteers between the ages of 18 and 35. All participants had smoked marijuana at least 10 times in the 6 months prior to the study. Two questionnaires were administered in a laboratory at McGill University in Canada. These instruments were the Drug History Questionnaire, to assess subjects' backgrounds and drug histories, and the Marijuana Effects Questionnaire, to measure the frequency of particular marijuana effects in the previous 6 months. The program BMDX 72 was used for factor analysis. Univariate analyses of variance were applied to the drug history variables to determine their effects on specific factors.

RESULTS

An analysis of the demographic variables indicates that 56 percent of the subjects were between the ages of 18 and 21 and that 81 percent had some education at the college level. Almost all reported using both legal and illegal drugs; 95 percent used alcohol, 65 percent smoked cigarettes, and 80 percent drank tea or coffee. Approximately 65 percent used cannabis at least twice a week (30 percent daily). Moreover, almost 80 percent had experimented with psychedelics, half had used speed or opium, and 21 percent had tried heroin; 76 percent reported using other drugs such as cocaine, peyote, and tranquilizers. Cannabis was used regularly by most of the subjects, while psychedelics, speed, or heroin were not. About 75 percent of the participants had used alcohol and cigarettes by age 15, a large number were introduced to marijuana and hashish before age 15, and 71 percent reported taking LSD before age 18.

The 10 most common effects of marijuana use reported were good feelings, ease in sleeping, ability to "come down" at will, subtle sound changes, less noisiness than under alcohol intoxication, new pleasures in orgasm, enjoyment of eating, distance changes, physical relaxation, and slow passage of time. Four factors were common to the marijuana experience: enhancement of tactile sensation (most common), creative lucidity, social withdrawal, and loss of contact with verbal thought. Four other factors occurred infrequently during intoxication: spiritual or mystical experience (least common), enhancement of nondominant sense, increased emotionality, and loss of control over usual perceptions.

Creative lucidity was affected by three variables: the amount of marijuana smoked, use of mescaline in the last 6 months, and occupation. Specifically, subjects who smoked two marijuana cigarettes or less at a time and who had not used mescaline in the last 6 months had the most creative experience. Students scored highest and individuals working in crafts scored lowest on creative lucidity. Subjects who had used LSD more than 100 times experienced the most loss of contact with verbal thought when smoking marijuana. Moreover, infrequent use of marijuana was likely to produce a mystical or spiritual experience. In addition, the older subjects were when they were introduced to hashish the more social withdrawal they experienced when intoxicated. Students who smoked marijuana twice a week or more had greater control over their usual perceptions when intoxicated. Enhancement of tactile sensation was more marked in subjects who smoked hashish infrequently.

CONCLUSIONS

Findings suggest that marijuana is being used increasingly with other drugs, that individuals are being introduced to cannabis earlier than in the past, and that cannabis is being used more heavily than previously reported. While patterns of drug use may vary over time, the subjective marijuana high seems to be a relatively stable and definable experience. Heavy marijuana users appear to experience less pronounced effects, as reported in the literature. Contrary to earlier reports, however, heavy users experience common and rare effects less acutely than do infrequent users, indicating habituation at a physiological or expectation level. In light of these findings, marijuana intoxication can be viewed as a mild, pleasant experience, although research has pointed to the many individual differences in response to marijuana.

Wingard, J.A.; Huba, G.J.; and Bentler, P.M. The relationship of personality structure to patterns of adolescent substance use. Multivariate Behavioral Research, 14:131-143, 1979.

DRUG	Multidrug
SAMPLE SIZE	1,634
SAMPLE TYPE	Seventh, eighth, and ninth grade students
AGE	Adolescents
SEX	Both
ETHNICITY	Spanish; black; Oriental; white
GEOGRAPHICAL AREA	Los Angeles, California
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires; Bentler Psychological Inventory
DATE(S) CONDUCTED	1975
NO. OF REFERENCES	38

PURPOSE

The relationship of personality structure to patterns of drug use has become a topic of major interest in the last decade. However, lack of attention to issues of instrument validity and to the necessity for cross-validating results has complicated the interpretation of many findings. The present study seeks to examine the relationship between personality and substance use in adolescents by employing assessment instruments with acceptable psychometric properties and by employing a proper procedure for cross-validating results.

METHODOLOGY

The sample consisted of 1,634 students in the seventh grade (mean age, 12.42 years), eighth grade (mean age, 13.44 years), or ninth grade (mean age, 14.34 years) in 11 schools in the greater metropolitan area of Los Angeles, California. Schools were initially contacted through their district offices in the fall of 1975 and then solicited for their voluntary participation in a 5-year study of adolescent drug use. For purposes of cross-validation, the total sample was divided into groups of 818 and 816 students by random assignment within the cells formed by

the cross-classification of school, grade, and sex. Both males and females belonging to Spanish, black, Oriental, and white ethnic groups were represented.

Questionnaire items assessed frequency of use for cigarettes, beer, wine, liquor, cocaine, tranquilizers, drugstore medications, heroin and other opiates, marijuana, hashish, inhalants, hallucinogens, and amphetamines. Each subject completed a short version of the Bentler Psychological Inventory (BPI), which measured agility, ambition, art interest, attractiveness, body weight, cheerfulness, clothes-consciousness, congeniality, deliberateness, diligence, extroversion, flexibility, and other factors. Participating subjects were group-tested by three project research assistants in rooms that had been reserved for testing at each school. For each of the 2 samples the total set of 39 variables was intercorrelated and the resulting Pearson product-moment coefficients were used in a canonical correlation analysis. The canonical loadings obtained for the two domains (i.e., substance use questions and BPI scales) in each sample were rotated using a generalization of Bentler's orthoism method, which seeks to provide the best simultaneous simple structure solution for two loading matrices. The solutions were then evaluated for their degree of convergence through the use of congruence coefficients.

RESULTS

Findings indicated a pattern of general substance use in both samples, especially for cigarettes, beer, wine, liquor, marijuana, hashish, inhalants, tranquilizers, and amphetamines. General substance use was correlated in both samples not with a single personality trait but with a personality cluster marked by nonabidance with the law, liberalism, leadership, extroversion, lack of diligence, and lack of deliberateness. In the first sample, 10.3 percent of the substance use variability and in the second sample 9.4 percent of the substance variability were explained by the personality dimension. The set of personality correlates of drug use was not unifactorial.

CONCLUSIONS

In view of the heterogeneity of personality variables predictive of drug use, the evolution of adolescent substance use should be interpreted from an interactionist-socialization perspective. Such a theory recognizes that certain personality attributes are likely to predispose the adolescent to resist socialization into traditional adult roles prescribed by current cultural norms and to endorse nontraditional socialization influences from nonconforming peer cultures and nonconventional adults. Study results are consonant with the notion that mechanisms for potential social support of nontraditional behavior are developing among adolescents through the interplay of personality and patterns of peer and adult social interaction. Thus, while further association with suppliers and users of drugs may lead to a global change in attitudes, friendship patterns, and lifestyle, this differentiation has yet to occur by the ninth grade in a sample of noninstitutionalized adolescents.

Adams, A.J.; Brown, B.; Haegerstrom-Portnoy, G.; Flom, M.C.; and Jones, R.T. Marijuana, alcohol, and combined drug effects on the time course of glare recovery. Psychopharmacology, 56:81-86, 1978.

DRUG	Marijuana; alcohol
SAMPLE SIZE	10
SAMPLE TYPE	Moderate users
AGE	Young adults (range: 20-32)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Intoxilyzer; self-reports of intoxication levels; glare recovery test
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	11

PURPOSE

The human eye can adapt to a wide range of environmental light levels, but this process is slow, particularly if the eye must adjust to a considerably lower light level. Several drugs and retinal diseases delay recovery of sensitivity even when no detectable change in visual acuity occurs. A recent double-blind experiment showed that relatively low doses of alcohol produced significant increases in the time taken to recover sensitivity to low-contrast objects following bright light exposure.

Because few studies have investigated the influence of marijuana on the visual adaptation process, this research tested the hypothesis that marijuana, like alcohol, retards glare recovery and explored the effects of a combined dose of alcohol and marijuana on this function.

METHODOLOGY

A total of 10 subjects ranging from 20 to 32 years old participated in a replicated 5 x 5 Latin square experiment. All were currently smoking three to five marijuana cigarettes per week and usually consumed three to four glasses of beer or wine on each occasion. The five experimental

treatments were: (1) placebo, (2) 0.75 ml/kg of 95 percent ethanol, (3) 8 mg THC, (4) 15 mg THC, and (5) the ethanol combined with 15 mg THC.

Subjects were allowed 20 minutes to consume the drinks from covered paper cups, each containing two ice cubes. Subjects also smoked a marijuana cigarette each time they were tested, beginning 10 minutes after starting to drink. Participants were tested before drinking and 40, 120, and 300 minutes after drinking. Blood alcohol levels were estimated with the Intoxilyzer, and subjects rated their own levels of intoxication on a scale of 1 to 100.

In the glare recovery tests, participants fixed their right eyes on the center of a stimulus configuration from a distance of 3 meters where an arc white test spot was intermittently presented. When subjects recovered contrast sensitivity to a fixed contrast, they pressed a switch and a computer reduced the test luminance. In this manner, the computer recorded the time taken to recover to five predetermined contrasts. Pupil size was measured (from projected negatives) 5 seconds before and 5 seconds into exposure of the high-intensity adapting stimulus for the first trial of each test period.

RESULTS

Both marijuana and alcohol delayed recovery for at least 2 hours after ingestion. Recovery at 40 minutes for 8 mg THC produced an increase in recovery time of about 6 percent; there is an increase of about 8 percent in recovery time for 15 mg THC. Two hours after smoking, the pulse rate was at presmoke levels, but the glare recovery time was delayed. Thus, the time course followed "high" ratings more closely than pulse changes. Glare recovery time was longer with the combined alcohol and marijuana dose than with either drug dose alone, but the difference was not statistically significant. Fewer subjects showed a postdrug increase in glare recovery with the combined dose than for either drug condition alone; the mean increase in glare recovery time was produced by a few subjects where the combined dose produced relatively large changes. The lack of statistical significance suggests that the combined drug treatment results in some drug interaction, evidenced by blood alcohol estimates for the combined drug treatment. Pupil diameter was unaffected by alcohol at the low photopic levels of the testing situation, but marijuana did produce a statistically significant change in pupil diameter at the 40-minute measurement period.

CONCLUSIONS

This study confirms previous findings that alcohol significantly retards glare recovery. The peak effect probably occurred within the first hour after drinking; after 5 hours glare recovery time returned to predrink levels. The lack of pupil changes provides strong evidence that this delay is caused by alcohol acting directly on the retina. Marijuana also retards glare recovery. This delay is probably caused not by peripheral ocular factors but by the drug's direct action on the retina. An alternative explanation could be that subjects under the drug's influence change their criterion for threshold in detecting the test spot. The retinal hypothesis for glare recovery delays could be tested by recording the retina's electrical activity with noninvasive electroretinogram techniques.

While previous studies have shown that the combined use of marijuana and alcohol have additive effects on certain psychomotor and physiological functions, others have found the combination to produce some antagonistic effects on variables such as visual imagery. The glare recovery results on combined use indicate some antagonism between the substances, a suggestion supported by subjects' significantly lower blood alcohol level when combined marijuana-alcohol doses were taken than when alcohol alone was consumed.

Babor, T.F.; Mendelson, J.H.; Gallant, D.; and Kuehnle, J.C. Interpersonal behavior in group discussion during marijuana intoxication. The International Journal of the Addictions, 13(1): 89-102, 1978.

DRUG	Marijuana
SAMPLE SIZE	26
SAMPLE TYPE	Heavy users; moderate users; nonusers
AGE	Young adults
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Belmont, Massachusetts
METHODOLOGY	Experimental/descriptive survey
DATA COLLECTION INSTRUMENT	Observations; interviews; questionnaires
DATE(S) CONDUCTED	1973-1974
NO. OF REFERENCES	23

PURPOSE

Conflicting assumptions about marijuana's effects on the user underlie the current debate over its legalization. Questions regarding marijuana's effects have concerned personality alterations, social functioning, and antisocial behavior. One pattern of behavioral change attributed to chronic marijuana use had been termed the "amotivational syndrome." Debate has also centered over whether marijuana's alleged negative consequences relate to the drug's pharmacologic action or to other factors. Some investigations suggest that marijuana has predictable effects on interpersonal behavior but that these reactions may diminish with continued use. This research was designed to explore these phenomena in greater detail through a study of changes in group participation and role behavior.

METHODOLOGY

Studies were conducted in 1973-1974 on a clinical research ward at the Alcohol and Drug Abuse Research Center at McLean Hospital in Belmont, Massachusetts. Four-person groups of moderate and heavy marijuana users were studied in a group discussion situation during marijuana intoxication. Non-drug-using control groups, matched on relevant background variables, were

included in the study. Each study lasted 31 days and consisted of a predrug baseline period of 5 days, a 21-day drug period during which marijuana cigarettes could be purchased and smoked on a free-choice basis, and a 5-day postdrug period.

Adult male volunteers between the ages of 21 and 26 years were recruited through advertisements placed in local newspapers. Interview and questionnaire data were used to classify users in terms of marijuana use. Subjects were observed in task-oriented discussions each weekday afternoon during the study's three phases; each group met a total of 21 times. Discussions involved conflicts between obligations to a friend and obligations to society. Groups were asked to express opinions and reach a consensus. During each group discussion, ongoing interaction and role behavior were observed according to Bales's procedure. Bales's Interpersonal Rating Form was used to define the social role of each participant in terms of a three-dimensional model of group behavior. Data were analyzed by comparing predrug and postdrug baseline behavior to that observed during the drug period. Specific groups were selected for analysis based on participants' ratings of their level of intoxication.

RESULTS

Both heavy and moderate marijuana users tended to interact less during the drug period, but only moderate users demonstrated significant differences between means as well as a significant quadratic trend. On the dimension of task-orientation, control subjects showed no significant trends or differences between session means, but moderate and heavy users showed quadratic trends. The trend toward less task orientation during the moderate users' sessions began only during the second quarter of the drug period; these subjects actually attained their highest ratings on task orientation during the first quarter of marijuana intoxication. All groups were rated positive on the positive-negative role dimension, but no group indicated significant trends or variations between session means. Similarly, no significant differences were noted on the dominance-submission continuum, but heavy users indicated a significant quadratic trend toward less dominance during the last three quarters of the drug period.

CONCLUSIONS

Results offer partial support for the hypotheses that marijuana has predictable effects on interpersonal behavior in the areas of group participation and task orientation and that tolerance to these reactions may develop in heavy users. Findings are also consistent with previous research showing that reductions in the amount of interaction and task-oriented content were directly related to marijuana intoxication. However, results do not confirm the prediction that the role dimensions of dominance and friendliness would also be affected by marijuana intoxication.

Marijuana precipitates social withdrawal in moderate users, and the effects of marijuana on verbal interaction may be mitigated by behavioral tolerance. These results may be due to impaired cognitive performance, to changes in motivation, or both. Findings suggest that one effect of intoxication is to make the subjective experience more salient and to produce a more internal, contemplative orientation. Tolerance does develop to many of marijuana's acute effects but only after a relatively heavy level of consumption is attained and maintained. Moreover, findings indicate an amotivational syndrome, which did not last beyond the period of acute intoxication. The findings have implications for the potential use of marijuana as a therapeutic agent in group therapy since marijuana intoxication may suppress therapeutically oriented verbal interaction. Results are also applicable to drug education presentations. Such presentations should limit statements about marijuana's impairment of social functioning to descriptions of the less experienced user; users who have developed behavioral tolerance to the social effects of marijuana would not find such statements credible.

Brook, J.S.; Lukoff, I.F.; and Whiteman, M. Family socialization and adolescent personality and their association with adolescent use of marijuana. The Journal of Genetic Psychology, 133:261-271, 1978.

DRUG	Marijuana
SAMPLE SIZE	568
SAMPLE TYPE	Adolescents and their mothers
AGE	13 to 17 years; mature adults
SEX	Both
ETHNICITY	American black; white; British West Indian black
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires; interviews
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	21

PURPOSE

Past research on family socialization, adolescent attitudes, and adolescent behavior has generally involved only simple analyses of relationships between two of these three factors. Research on the interconnection of family and adolescent personality/attitudinal domains and their relationship to adolescent marijuana use has been, with a few exceptions, neglected. The present study examines family socialization practices and adolescent personality/attitudinal characteristics, their interrelation, and association with adolescent use of marijuana. Data on family socialization factors were gathered from the mother rather than from the adolescent. The study hypothesizes that parental socialization factors and adolescent personality/attitudinal attributes each has an independent effect on adolescent marijuana use and each comprises its own set of sufficient conditions for adolescent marijuana use.

METHODOLOGY

A total of 284 adolescents and their mothers served as study subjects. The subjects included 93 American black, 97 white, and 94 British West Indian black mothers and their oldest adolescent child between the ages of 13 and 17. The adolescents included 42 male and 51 female

American blacks, 47 male and 50 female whites, and 55 male and 39 female British West Indian blacks. The adolescents and their mothers came from low social class, urban backgrounds. Each of the subjects was interviewed for about 1 hour by a member of the same ethnic group. Questions for the mothers concerned the mother's own personality, attitudes, expectations and aspirations regarding her child, familial techniques of adolescent control, and the nature of family activities involving the adolescent. Questions for the adolescent concerned mainly personality and attitudinal dimensions. The interview items' intercorrelations were used to develop several separate scales for parents and for adolescents. Parent scales concerned assertion, educational expectations and aspirations, activities involving shared responsibility, rules, and adolescent reaction to rules. Adolescent scales concerned social desirability (Marlowe-Crowne Scale), locus of control, and attitude toward deviance. Adolescent self-reported marijuana use was classified into three categories: no marijuana, only marijuana, or marijuana plus other illicit drugs.

RESULTS

Maternal assertion, educational expectations, and educational aspirations were negatively related to adolescent marijuana use, as were the number of rules enforced by the adolescents' parents and parent-child involvement in current activities. Further, adolescents who rebelled against parental rules were more likely to use marijuana than were those who conformed. Adolescent marijuana use was also positively related to the adolescent's tolerance of deviance and orientation toward an internal locus of control and negatively related to Marlowe-Crowne scales, which were a measure of conformity. About 21 percent of the variation in adolescent use of marijuana could be explained by the combined influence of the parent socialization and adolescent personality/attitudinal domains. Multiple regression analysis indicated that parent socialization and personality/attitudes had an independent effect on adolescent use of marijuana. Within the family domain, parental rules, reaction to rules, and assertion had an independent effect on adolescent use of marijuana when the adolescent personality/attitude domain was controlled for. However, maternal educational expectations and aspirations and parental involvement in activities did not have a significant effect on marijuana use when the personality/attitudinal domain was controlled. Attitude toward deviance appeared to be the strongest predictor variable within the adolescent personality/attitude domain. The highest predictor of use of marijuana among the parent socialization factors was the rules set down by the parents. However, rules in the parent domain did not interact with attitude toward deviance in the personality domain.

CONCLUSIONS

Results support the study hypothesis that parental socialization and the personality/attitudes of the adolescent both appear to be independently related to adolescent use of marijuana. The parent socialization domain has a direct effect on adolescent use of marijuana and does not act through the adolescent's personality or attitudes. Similarly, the adolescent personality domain has a direct effect on use of marijuana. Both factors are crucial determinants of adolescent marijuana use. Results are consistent with the findings of several other studies. They suggest that an adolescent's marijuana use may be due to factors within the individual even in the presence of familial factors militating against marijuana use or, alternatively, to familial factors even in individuals without personalities disposed to marijuana use.

Ginsberg, I.J., and Greenley, J.R. Competing theories of marijuana use: A longitudinal study. Journal of Health and Social Behavior, 19:22-34, 1978.

DRUG	Marijuana
SAMPLE SIZE	319
SAMPLE TYPE	College students
AGE	Young adult
SEX	Both
ETHNICITY	White (97 percent)
GEOGRAPHICAL AREA	Wisconsin
METHODOLOGY	Survey--longitudinal-panel
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	November 1971-January 1974
NO. OF REFERENCES	72

PURPOSE

Marijuana use, especially among college students, has grown markedly in the United States in the past 10 years. However, constructive debate over public policy on the use and possession of marijuana has been hampered by a lack of adequate empirical tests that assess the relative independent predictive power of theories designed to account for marijuana use. From the commonly used cross-sectional data, it is impossible to conclude whether correlates of marijuana use represent causes or consequences of its use. Longitudinal studies that temporarily order variables permit more confident conclusions about causes versus effects. This study examined longitudinal data on college students' marijuana use to examine critically the relative predictive adequacy of several theories.

METHODOLOGY

Four theories of marijuana use were examined. Referent group theory suggests that a person may use marijuana in an attempt to emulate others who use it. Commitment theory suggests that deviant behavior will be more likely if a person's attachment and adherence to the norms and values of society in general are weak. Stress theory attributes marijuana use to a person's

desire to escape from personal or psychological problems. Involvement theory attributes nondeviant behavior to an individual's involvement in conventional activities.

A self-administered questionnaire was mailed to a random sample of all students registered at the University of Wisconsin--Madison in November 1971. With repeated followups, an 82 percent response rate was obtained, representing 1,502 students. The 319 respondents who were freshmen or sophomores at the time of the original survey and who were still registered students in January 1974 were mailed a followup questionnaire, to which 86 percent responded, for a sample of 274 students. Respondents were compared with 45 enrolled nonrespondents, using information from the original survey. Subjects were asked about their frequency of marijuana use, the use of marijuana in students they admired, attitudes and participation in religious and political fields, attitude toward work, psychological distress, personal problems, and number of hours per week spent in various activities. A multiple regression path analysis was used to examine the data.

RESULTS

Marijuana use was common and increased over the 2-year study period. For example, the percentage of respondents using marijuana more than 12 times in the past 12 months increased from 25 percent among the freshmen and sophomores to 36 percent among the juniors and seniors. The proportion of the original sample who had become heavy users was probably slightly underestimated because a small but statistically significant proportion of heavy marijuana users left the university during the study period. Use of marijuana was significantly higher among students whose fathers had higher status occupations, as indicated by the Duncan occupational status index, and lower among those whose mothers were Protestant in religious orientation. No significant relationships were found between marijuana use and sex, age, college year, size of community of origin, or father's education.

Involvement in conventional activities, such as university course work and campus organizations, was not significantly related to drug use at either the initial or the followup period. Marijuana use was significantly and substantially higher among students who admired and identified with marijuana users. In addition, students with less commitment to conventional institutions were significantly more likely to report higher frequencies of marijuana use than were more committed students. Finally, marijuana use was significantly higher among students initially reporting higher levels of psychological distress. Thus, the zero order correlations provided evidence in support of reference group theory, commitment theory, and stress theory. Use of path analysis to assess the relative importance of these theories showed that orientation to a marijuana-using reference group was the most substantial predictor of marijuana use in the study. The followup, however, revealed some conflicting evidence. Marijuana use at followup was not related to initial lack of commitment to conventional institutions, directly or indirectly, when statistical controls for other theoretical variables were applied. In addition, psychological distress at followup was associated with lower levels of initial marijuana use, when other spurious effects were removed.

CONCLUSIONS

Findings were consistent with other longitudinal and cross-sectional studies indicating that marijuana use and identification with a marijuana-using reference group may be engaged in a reciprocal causal relationship in which each affects the other. Data indicate that marijuana use is not an antisocial act reflecting negative feelings toward the larger society but is a positive act designed to emulate others and probably to help integrate the marijuana user into the peer group. Increased psychological distress resulting from reference-group identification and changes in family relationships and self-concept appeared to be a result rather than a predictor of marijuana use. Conclusions are limited by such study assumptions as the equality of the measurement interval and the causal lag period. Results may not generalize to other populations, especially noncollege cohorts. Nevertheless, study results strongly support the hypothesis that identification with a marijuana-using reference group is a prime determinant of the use of marijuana by college students. Institutional commitment, involvement with conventional activities, and psychological distress appeared at followup to have little or no impact on subsequent marijuana use among college students.

Joe, G.W., and Hudiberg, R.A. Behavioral correlates of age at first marijuana use. The International Journal of the Addictions, 13(4):627-637, 1978.

DRUG	Marijuana
SAMPLE SIZE	370
SAMPLE TYPE	Veterans
AGE	Not specified
SEX	Male
ETHNICITY	Black; white; other
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Statistical analysis
DATA COLLECTION INSTRUMENT	Survey statistics
DATE(S) CONDUCTED	1971
NO. OF REFERENCES	5

PURPOSE

The relationships between the age at initial marijuana use and behavior at the same time and later have been generally ignored in studies of marijuana use and effects. Age at initial use is an important sociological variable in the classification of deviance in subcultures. This study examined the relationships between age at first marijuana use and selected behavioral measures, based on data collected in a previous survey.

METHODOLOGY

The present sample consisted of 370 male veterans of the Vietnam war who indicated having used marijuana before entering the military service. The study's independent variables were the age at first marijuana use and race-ethnic group. Dependent variables included six drug variables: use of marijuana, downers, uppers, opiates, alcohol, and age when the person first became drunk. The measures of education used were educational attainment, number of school grade failures, and school attendance. The employment variable referred to ever having held a full-time job. Data were also collected on arrests and juvenile delinquency. Both chi-square and correlational analysis were used to determine the relationship of age at first marijuana use to

the behavioral measures. Factor analysis was used where the two types of analysis produced consistent results.

RESULTS

Except for the number of grades failed, all the behavioral measures were significantly associated with age at first marijuana use on the basis of the chi-square analysis. The data indicated that persons who began marijuana use by age 15 or 16 were more likely than persons beginning use at an older age to show deviant behaviors prior to entering the service. Proportionately fewer of those who began marijuana use at a younger age graduated from high school, attended school regularly, and had ever held a full-time job, while more had been arrested or had been in juvenile court. Moreover, more frequent drug use appeared to be positively related to early age of marijuana use. The age at first marijuana use was also positively related to the age at first opiate use. The direction of the relationships was the same for both blacks and whites. Further correlational analysis produced additional confirmation of the association between age at first marijuana use and the behaviors studied. The factor analysis showed that nearly 11 percent of the variance in the drug use factor is predictable from the age at initial marijuana use, while almost 9 percent of the variance in the school dropout factor was predictable from the age at first use. In contrast, only 1 percent of the factor related to the propensity to other forms of delinquency was predictable from the age at initial marijuana use.

CONCLUSIONS

Results indicated that the age at first marijuana use may be a useful indicator of the probability of developing a deviant lifestyle. For example, the age of first marijuana use was predictive of certain behaviors, such as dropping out of high school and not holding a full-time job, commonly considered prerequisites for functioning in normal society. The correlations between early age of marijuana use and later drug use, as well as probabilities of being arrested or brought to juvenile court, suggest additional vulnerability to future legal and physical problems among early marijuana users. Those who begin marijuana use at a later age are more likely to acquire the basic tools, such as education, for achieving success goals. Findings implied that drug treatment programs should aim toward the social rehabilitation of those who lack basic education and socialization and have never learned an orientation to work. Findings also imply that integrative programs on delinquency prevention are needed.

Johnston, L.D.; O'Malley, P.M.; and Eveland, L.K. Drugs and delinquency: A search for causal connections. In: Kandel, D.B., ed. Longitudinal Research on Drug Use: Empirical Findings and Methdological Issues. Washington, D.C.: Hemisphere, 1978. Pp. 137-156.

DRUG	Multidrug
SAMPLE SIZE	1,260
SAMPLE TYPE	High school students
AGE	15 to 23 years
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Longitudinal survey--panel
DATA COLLECTION INSTRUMENT	Interviews; questionnaires
DATE(S) CONDUCTED	1965-1974
NO. OF REFERENCES	16

PURPOSE

The study investigated the relationship between illicit drug use and crime; it examined the effects of drug use on rates of subsequent delinquency and the impact of delinquency on later drug use. Longitudinal measures of both drug use and delinquent behavior provide an unusual opportunity to examine the cross-time relationships between these variables.

METHODOLOGY

The longitudinal study of drug use supplemented an ongoing survey begun in 1965 on the causes and effects of students' dropping out of high school. The initial sample consisted of approximately 2,200 10th grade boys attending 87 high schools across the United States. The group was representative of young men from about 15 to 23 who began high school in the 10th grade in 1966, graduated in 1969, and composed the college class of 1973. Data collection included a personal interview, a group-administered questionnaire, and a series of ability tests. Over 97 percent of the sample agreed to participate. Followup studies were conducted in 1968, 1969, and 1970, and a self-administered questionnaire was used for the fourth followup survey in 1974.

Full followup information was obtained on 73 percent of the original sample. The final cross-time sample filtered for missing data encompassed 1,260 cases.

Questions specifically dealing with drugs were included only in the fourth and fifth surveys and covered individuals' personal use of each of a number of drugs during two different time intervals (a total of four different time intervals for both surveys). The five categories for measuring drug use were based on a combination of the judged or perceived seriousness of the drug (marijuana, any other illicit drugs except heroin, and heroin, in that order) and the degree of involvement with each (experimental use versus more than experimental use). Delinquency was measured at all five time points, and indices covered theft and vandalism as well as interpersonal aggression. For the first three time periods, however, data could not be linked to individuals because confidentiality could not be guaranteed. Inferential measures indicate that the measures have considerable validity.

RESULTS

Static relationships between drug use and delinquency. Illicit drug use related positively and strongly to other forms of illegal behavior. The greater the degree of an individual's involvement with drugs, the higher the expected level of delinquency. Crimes against property were related to illicit drug use to a greater extent than were crimes against persons. Of the specific crimes against property investigated, those that tended to be most strongly related to illicit drug use were minor theft, shoplifting, and trespassing. Young men who used only marijuana were lower than the other drug-using groups on both indices of delinquency, with a level of interpersonal aggression quite close to that observed for abstainers.

Dynamic relationships between drug use and delinquency. User groups proved substantially more delinquent than nonuser groups even before they had ever used drugs. Under these circumstances, their delinquent behavior could hardly be attributed to drug use. Furthermore, by age 23 the various user groups from 1969 to 1970 began to converge with each other and with nonusers in their levels of interpersonal aggression, indicating that any effects of drugs on interpersonal aggression must have been short lived. A similar case could be made for theft and vandalism, although less dramatically. Analysis of the user groups defined during 1969-1970 showed some support for the notion that drug use and delinquency covaried. The user groups defined in 1973-1974, which contained a number of people who were not users in 1969-1970, revealed less evidence of covariation. Thus, the evidence could support the notion of drug use causing some modest incremental changes in delinquency in the short term, but the evidence also supported a number of plausible alternative explanations. Analysis using cross-lagged panel correlation produced little support for a hypothesis that drug use is predictive of any substantial increase in later delinquency. Finally, no differential change was noted in delinquency rates associated with changes in drug use. The only exception was observed in the subgroup that shifted from marijuana use to other than marijuana use; this subgroup did not show a decrease in theft and vandalism between 1969-1970 and 1973-1974 as did the other subgroups. Whether this means that involvement with more serious drugs is critical to a relative increase in delinquency is unclear.

CONCLUSIONS

While illicit drug use is apparently related to other forms of illegal behavior, the preponderance of the delinquency differences among nonusers and various eventual drug-user groups appears to exist before drug usage ever begins and therefore cannot be attributed to drug use. No evidence was found of a lasting impact of drug use on delinquency levels. This does not, however, preclude the possibility of short-term effects of drug use on delinquency that could not be measured with the measurement intervals used in the present study. On the whole, nonaddictive use of illicit drugs does not seem to play a significant role in encouraging users to be more delinquent than before drug use. The reverse (i.e., that delinquency leads to drug abuse) seems more plausible. The correlation may involve both environmental factors and individual personality factors such as proneness to deviance.

Kandel, D.B. Convergences in prospective longitudinal surveys of drug use in normal populations. In: Kandel, D.B., ed. Longitudinal Research on Drug Use: Empirical Findings and Methodological Issues. Washington, D.C.: Hemisphere, 1978.

DRUG	Marijuana; multidrug
SAMPLE SIZE	Not specified
SAMPLE TYPE	High school and college students; Vietnam veterans
AGE	14 to 22 years
SEX	Not specified
ETHNICITY	Black; white
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	1969-1971
NO. OF REFERENCES	98

PURPOSE

Until recently, most longitudinal data relevant to drug use were obtained in followups of clinical populations of heroin addicts. However, research on individuals already addicted precludes investigation of many issues relevant to the understanding of drug behavior and of precursors and consequences of drug use. To remedy this lack of information, the present study reports findings of a series of prospective longitudinal epidemiological studies of young drug users in their natural settings initiated in the late 1960s and early 1970s.

SUMMARY

The studies detailed were selected from 21 longitudinal studies on the basis of sample size, richness of information collected, theoretical underpinnings, sophistication of analyses, and strength of results. Most of the studies were initiated in the United States between 1969 and 1972. The earlier studies focused on white respondents, while the later studies dealt with black ghetto youths. The bulk of the samples consisted of high school and college students, although several were devoted to soldiers in Vietnam. The studies covered the period in the life cycle involving the greatest risk of drug abuse (i.e., ages 14 to 22). The number of contacts with respondents

was two, at intervals of 6 months to 4 years, with followup periods ranging from 6 months to 8 years. In all cases data were collected through structured instruments, either personal interviews or questionnaires. Information was generally gathered on respondents' drug use, on their social and psychological characteristics, and less frequently on characteristics of their interpersonal context.

With regard to patterns of involvement with illicit drugs, study findings indicate that the period of risk for initiation into illicit drug use is over by the mid-twenties. Many young people who have tried marijuana appear to try other illicit drugs. However, individuals who become involved with drugs later tend to be less involved and to stop drug use sooner than individuals who start using at an early age. There are clear developmental sequences in drug behavior; use of one of the legal drugs (e.g., beer or tobacco) usually precedes use of illegal drugs. In this scheme, marijuana appears to be a crucial step in the initiation of other illicit drug use. Finally, addiction to heroin is not necessarily a permanent state, and occasional use of heroin does not necessarily lead to addiction.

Most research on antecedents of drug use has focused on personality variables, involvement in delinquency, attitudes and values favorable to drug use, and interpersonal influences of family and peers. Findings generally indicate that dysfunctional attributes of drug users precede drug use. Different factors are involved in the transitions into different stages of drug use. Adolescents' beliefs and values favorable to the use of marijuana and association with marijuana-using peers are the strongest predictors of marijuana use. Furthermore, personality factors indicative of maladjustment precede the use of marijuana and other illicit drugs. These personality variables include rebelliousness, high expectations for independence, a low sense of psychological well-being and a low sense of personal alienation, low self-esteem, and low academic aspirations and motivation. Social presence and sociability seem to be the most prominent positive traits of future marijuana users, and poor school performance is a common antecedant of subsequent initiation into illicit drug use, particularly marijuana use. Delinquent and deviant activities may also precede involvement with illicit drugs. Furthermore, a constellation of attitudes and values, such as lack of interest in conventional institutions and low conformity to adult expectations, precedes marijuana use, as do drug behavior and drug-related attitudes of peers. Moreover, youths who will initiate the use of drugs, particularly marijuana, undergo a process of anticipatory socialization in which they develop attitudes favorable to drug use prior to actual use.

Parents' behaviors, attitudes, and closeness to their children have differential importance at various stages of drug involvement. Parental factors have their greatest importance for the third stage of drug involvement (i.e., the use of illicit drugs other than marijuana). Sociodemographic variables hold little predictive power for initiation into marijuana use, but a social setting favorable to drug use (e.g., the Vietnam experience) reinforces and increases individual predisposition to use drugs. Finally, the age of onset of drug use declines as the degree of proneness to deviance increases; this applies to both marijuana use and other behaviors.

Much less attention has been devoted to antecedants than to consequences of drug use. The only consequences to be explored are criminal behavior and the amotivational syndrome. In both cases, negative behaviors previously found to be associated with marijuana use seem to precede use rather than to result from it.

CONCLUSIONS

The establishment of sequential stages from legal to illegal drug use provides a useful strategy for pinpointing the role of specific factors in the transition to drug use. While many dysfunctional factors appear to precede drug use, few unfavorable outcomes, particularly for marijuana use, have been identified. Further testing of the propositions presented is contingent on resolution of a number of methodological problems. Standard definitions of drug behavior and reclassification of drug behavior according to developmental phases are needed. Sample attrition must be kept to a minimum and followup spans must be extended beyond 4 years. Multivariate techniques should be used cautiously to avoid obscuring significant unanticipated effects and dynamic processes of change. Further, cultural and historical conditions surrounding various kinds of drug behaviors should be taken into account, and more attention must be devoted to the development of a causal model and deviance theory, as well as to research on real positive and negative consequences of drug use. Finally, involvement in drugs must be examined as one among several behavioral outcomes of developmental processes in a natural setting so that both normal and aberrant behavior can be evaluated in the same context.

Kandel, D.B.; Kessler, R.C.; and Margulies, R.Z. Antecedents of adolescent initiation into stages of drug use: A developmental analysis. In: Kandel, D.B., ed. Longitudinal Research on Drug Use: Empirical Findings and Methodological Issues. Washington, D.C.: Hemisphere, 1978. Pp. 73-99.

DRUG	Alcohol; marijuana; other illicit drugs
SAMPLE SIZE	8,307 (4,406 students; 1,265 best schoolfriends; 2,636 parents)
SAMPLE TYPE	High school students; parent-student dyads; student-best schoolfriend dyads
AGE	Adolescents
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	New York State
METHODOLOGY	Longitudinal survey; multivariate analysis
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Fall 1971; spring 1972
NO. OF REFERENCES	67

PURPOSE

Adolescents' use of drugs provides the chance to examine the socialization processes in which values and behaviors are learned over time. Drug use is a behavior that has a clear beginning and that entails the resolution of conflicting social influences.

This study assesses the impact of parental and peer influences over time. It conceptualizes drug behavior as involving specific stages and focuses on the factors preceding entry into three specific stages of drug use: the use of hard liquor, the use of marijuana, and the use of other illicit drugs. The study assumes that interpersonal influences can be direct, indirect, or conditional and that direct effects can result either from imitation or from reinforcement. The analysis also focuses on the extent to which other factors, such as the adolescent's characteristics and the adolescent's relationship with other sources of influence, affect drug use.

METHODOLOGY

A multiphasic random sample of public secondary students in New York State was contacted in the fall and again in the spring of the 1971-72 academic year. The sample totaled 8,206 adolescents. Questionnaires were also mailed to one parent of each adolescent and were returned by

5,574 of the parents. In 5 of the 18 schools it was possible to obtain data from a student's best schoolfriend. The identification and linkage of records was made possible by the use of self-generated identification code numbers and after weighting of the student panel sample resulted in the inclusion of 5,423 students, 3,988 parent-student dyads, and 1,879 pairs of students and best friends at both time 1 and time 2.

Initiation to beer and wine was not examined because 82 percent of the sampled students had already used these substances by time 1. The 1,936 nonusers of hard liquor in time 1 were examined in time 2 in terms of whether they had started to use hard liquor or remained nonusers. Among the 1,947 adolescents who had used hard liquor or cigarettes more than twice by time 1, those who started using marijuana (17 percent) were compared with those who did not (83 percent). The 523 adolescents who had used marijuana as well as alcohol or cigarettes, or both, by time 1 were grouped into those who started to use other illicit drugs by time 2 (24 percent) and those who had not (76 percent).

At both times, the adolescents were asked how many times they had used certain substances, including hard liquor, marijuana, hashish, LSD, other psychedelics, methedrine, other amphetamines, barbiturates, tranquilizers, cocaine, heroin, other opiates, and inhalants. The extent of current use of beer, wine, and cigarettes was also noted. The 14 subclusters of independent variables characterized three major concepts: parental influences, peer influences, and adolescent intrapersonal characteristics. A total of 66 predictor variables were used for hard liquor, 100 for marijuana, and 93 for other illicit drugs.

The data were analyzed using multiple regressions with dummy dependent variables for continued abstention and initiation. To assess the relative importance of various types of factors as predictors of each stage of drug use, the significant predictors were grouped into four general clusters: parental influences, peer influences, adolescent beliefs and values, and adolescent involvement in a variety of behaviors.

RESULTS

Onset of the use of hard liquor was influenced by both example and individual predisposition. Both parents and peers provided examples of hard liquor use. Adolescent characteristics predicting hard liquor use were mild forms of deviation, including the extent of use of such drugs as beer and tobacco and participation in minor forms of delinquent activity.

Parental influences on adolescent marijuana use were minor and were related to parental attitudes and the closeness of the relationship between parents and children, and were not related to parental drug behaviors. By contrast, peer influences were substantial and varied. Among the strong predictors were perceptions of marijuana use in the peer group, the adolescent's perceptions of peer approval of drug use, the general extent of exposure to peer influences, and the availability of marijuana in the peer group.

Certain adolescent attitudes and activities were important predictors of initiation of marijuana use. These included the frequency of use of beer, wine, cigarettes, and hard liquor; minor delinquent activities; cutting classes; low grades in school; political behaviors; and a liberal political orientation. Lack of conformity to adult expectations, citing pleasure as the main reason for prior liquor use, and stating the desire to experience the effects of marijuana were significant predictors of initiation into marijuana use.

Year in school and kind of school were the only significant predictive factors among the demographic variables. The increasing number of users consistently observed in the higher grades of high school represent greater stability among the users rather than higher rates of conversion of users into nonusers.

The most important predictors of adolescent initiation into the use of other illicit drugs were poor relations with parents, lack of intimacy with the best schoolfriend, extensive use of marijuana, use of illicit drugs by the best schoolfriend, and feelings of depression.

CONCLUSIONS

Parental influences, peer influences, the adolescent's beliefs and values, and involvement in certain activities have different levels of importance for each of the three stages of drug use. Involvement in minor forms of deviant behavior is the most important class of predictors for initiation into hard liquor. Peer influences and the adolescent's beliefs and values have the most importance for initiation into marijuana. The dominant factor in the initiation into other illicit drugs is parental influences, especially the quality of the parent-child relationship.

The claim that drug involvement proceeds through discrete stages was supported. Many of the factors that have previously been found to be associated with drug behaviors actually precede the use of these drugs. For example, involvement in delinquent activities precedes hard liquor use, association with drug-using peers precedes marijuana use, and depression precedes the use of other illegal drugs.

Parents and peers are independent sources of influence who have different types of influences on different types of behaviors. The authors propose a model of generalized social interaction, according to which adolescents could display different levels of responsiveness to social influences. There may be areas in which adolescents behave according to an exclusive theory--relying mainly on parents, for example, but in other domains of behavior and under different social or cultural conditions, or both, they will display a high reliance on both parents and peers. The marijuana data suggest that both sources of influence can exert themselves independently of each other. Others' behaviors have more influence than others' beliefs and values, suggesting a modeling effect. Social factors play a more important role in the early stages of drug behavior, while psychological factors are more important in the later stages. Marijuana users fall in between the users of hard liquor, who initiate deviant behaviors as part of casual sociability, and users of illicit drugs, who are seeking drugs consciously or due to intrapsychic pressures.

Beyond the area of drug use, the findings indicate that situational and interpersonal factors are most important for initiation into deviant behavior, while intrapsychic factors are the most important for increased involvement in that behavior.

Kaplan, H.B. Deviant behavior and self-enhancement in adolescence. Journal of Youth and Adolescence, 7(3):253-277, 1978.

DRUG	Marijuana; narcotics
SAMPLE SIZE	3,148
SAMPLE TYPE	Junior high school students
AGE	Adolescents
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Houston, Texas
METHODOLOGY	Survey--longitudinal
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Spring 1971, 1972, 1973
NO. OF REFERENCES	84

PURPOSE

Numerous studies have suggested that self-rejection is associated with the adoption of a broad range of deviant patterns and/or that the adoption of such deviant patterns follows or accompanies the subjective expectation of outcomes associated with self-enhancement, whether the mode of deviance be drug abuse, alcohol abuse, or other forms of deviance. However, research has not demonstrated with consistency that deviant patterns actually have self-enhancing consequences.

This study considered the relationship between deviant behavior and self-enhancing consequences in the context of a prospective longitudinal research design examining deviance and self-attitudes of adolescents. The study hypothesized that deviant behavior by highly self-rejecting individuals would be generally associated with subsequent reductions in self-rejection, especially when mitigating circumstances, such as approval of others, were present. This hypothesis was derived both from a recent statement of a general theory of deviant behavior and from empirical studies, some of which tested other aspects of this theory. According to this theory, deviant responses result from self-rejecting attitudes and substitute new standards for the normative standards against which the self-rejection took place. In the present study, specific expectations were that deviant behaviors were more likely to have self-enhancing consequences among

males than among females and that males would have more active forms of deviance than would females. Empirical studies have supported the existence of gender differences regarding deviance.

METHODOLOGY

Data were collected in the course of a longitudinal survey study of an adolescent population in the Houston Independent School District (Texas). A 209-item structured, self-administered questionnaire was presented to the seventh grade students in 18 randomly selected junior high schools. The questionnaire was administered in the spring of 1971, 1972, and 1973. Of the 9,459 seventh grade students in the selected schools, 3,148 responded to all 3 questionnaires. Self-rejection was measured on a seven-item scale indicating self-attitudes. Self-enhancing consequences were measured in terms of the degree of reduction in self-derogation scores between the second and third test administrations. Deviant responses were defined in terms of self-reports of 28 acts, such as stealing, selling narcotic drugs, cheating on exams, smoking marijuana, and fighting. Deviant patterns were defined in terms of affirmative responses on both of the first two questionnaires. Data were analyzed according to sex, socioeconomic status, and level of self-derogation.

RESULTS

The hypothesized relationship between antecedent patterns of deviance and subsequent reduction in self-rejection was generally a function of the interaction between gender and the mode of deviance. As expected, among males of higher socioeconomic status, subjects with initially high self-rejection who adopted several modes of deviance showed greater reductions of self-rejection than those who did not adopt deviant patterns. The comparisons were statistically significant for eight of the deviant patterns. Greater decreases in self-rejection were associated with smoking marijuana, using alcohol, and six other behaviors. Self-rejection did not decrease as much among those with low and medium levels of self-rejection as among those with high levels of self-rejection. Among lower socioeconomic status males similar results were achieved, although not necessarily for all the same types of deviance. The findings for female subjects showed that the particular deviant responses that had self-enhancing consequences were more likely to be passive, nonaggressive responses that promoted reinterpretation of the affective significance of life events. Specifically, the expectation that drug abuse would have self-enhancing consequences among females was compatible with others' observations of a female-specific association of increase in alienation with adoption of marijuana use and of higher self-esteem among drug-taking females than among drug-taking males. As expected, among females with initially high levels of self-rejection the few deviant patterns associated with reductions in self-rejection related to drug abuse. Females of high socioeconomic status who used narcotics had greater subsequent decreases in self-derogation in comparison with those who denied narcotic use. Similarly, females with high levels of self-rejection who reported marijuana use had greater reductions in self-rejection than did reported female nonusers of marijuana. Among females of lower socioeconomic status none of the deviant patterns was significantly related to subsequent reductions in self-rejection among subjects with initially high self-rejection.

CONCLUSIONS

Findings call into question the assertions concerning the adverse effects on self-concepts of repeated deviant behavior, institutionalization, and coming to the attention of the authorities. Results also challenge other studies' conclusions that apprehension by the authorities has no consequences for the level of self-esteem. Instead, findings show that under certain conditions deviant behavior has self-enhancing consequences, especially when the deviant responses result in protection from negative responses by valued others and from self-rejection. These findings support the general theory of deviant behavior from which the expectations regarding self-enhancement were derived.

Kaplan, H.B. Self-attitudes and multiple modes of deviance. In: Lettieri, D.J., ed. Drugs and Suicide: When Other Coping Strategies Fail. Beverly Hills, Calif.: Sage, 1978. Pp. 75-116.

DRUG	Multidrug; marijuana
SAMPLE SIZE	4,694
SAMPLE TYPE	Seventh grade students
AGE	Adolescents
SEX	Both
ETHNICITY	White; black; Mexican-American
GEOGRAPHICAL AREA	Houston, Texas
METHODOLOGY	Longitudinal
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	April 1971 to May 1973
NO. OF REFERENCES	90

PURPOSE

Research findings suggest that various modes of deviance are preceded by diverse subjectively distressful experiences and serve to assuage distress. The question remains, however, whether the various deviant patterns are alternative ways of dealing with diverse problematic situations or whether the various deviant responses arise from common influences. The present study seeks to show that common influences determine the adoption and continuity of deviance and that the diverse modes of deviance are related to the central phenomenon of self-rejecting attitudes.

The self-attitudes and deviant behavior adopted are especially affected by the variables of gender, socioeconomic status, and minority status. Thus, while marijuana use by females is associated with alienation, marijuana use by males is connected to social criticism. The hypotheses tested in this study hold that the relationship between self-attitudes and deviant responses is consistently strongest in the subgroup in which the range of deviant behaviors is most likely to be defined as deviant and weakest in subgroups in which the range of deviant behavior is least likely to be defined as deviant. Also tested is the hypothesis that subgroups are highly variable in deviant responses associated with self-rejecting attitudes.

METHODOLOGY

The final study sample consisted of 4,694 seventh grade students in 18 junior high schools in Houston, Texas, during March 1971. A 209-item structured questionnaire was administered in March or April of 1971, 1972, and 1973. Four variables were considered: self-rejecting attitudes, as measured by scores on a 7-item self-derogation scale; deviant behaviors, as defined by self-reports on 28 acts; deviant definitions, as measured by frequency of acts committed; and population subgroups (8), as differentiated by gender, socioeconomic status, and majority/minority status. Students included in the sample reported that they had not performed the deviant behavior during the specified period prior to the first testing.

RESULTS

The data supported the expectation that drug behaviors were most likely to be consequences of high degrees of self-rejection when those behaviors were most likely to be defined as deviant. Such behaviors were least likely to be consequences of self-rejection when the behaviors were least likely to be defined as deviating from the norm. The upper class female minority group and to a lesser extent the lower class female minority groups, which were most likely to define behaviors as deviant, were also likely to display an association between earlier self-derogation and later adoption of deviant responses. In contrast, lower class male white Anglos, who were least likely to define behavior as deviant, were also least likely to adopt deviant behavior in response to self-rejection.

The data are clearly congruent with the expectation of subgroup variability in the pattern of deviant responses to antecedent self-rejecting attitudes. As previously stated, lower class male white Anglos were, with increasing levels of earlier self-derogation, significantly inclined to all forms of deviant behavior tested except school suspension, police contact, selling drugs, starting a fight, participating in a social protest, and smoking marijuana. Among higher class male minority subjects high levels of early self-rejection associated with theft, suicide threats, failing grades, and destruction. Lower class white female Anglos were likely to threaten or attempt suicide, break things in anger, carry a weapon, or commit burglary. Lower class female minority subjects tended to steal, to think about or threaten suicide, to participate in social protest, or to come to the attention of authorities. However, higher class white female Anglos were likely to steal, to threaten suicide, to cheat and to skip school, to start fights, and to use narcotics or smoke marijuana. Finally, the only deviant behaviors not associated with early self-rejection of higher class female minority subjects were larger thefts and burglary, carrying a weapon, and social protests or strikes. Nonsignificant associations between early self-derogation and subsequent deviant behaviors are also reported for each group.

CONCLUSIONS

The confirmation of the hypotheses supports the general theory of deviant behavior, which holds that self-rejection is a common antecedent of multiple modes of deviance when the deviant pattern is likely to be defined as such. The deviant patterns manifested are influenced by numerous factors, including gender, socioeconomic status, and race/ethnicity. This general theory offers great promise for interpretation of various deviant behaviors as antecedents, reflections, or consequences of negative self-attitudes and for producing new testable hypotheses.

Kaplan, H.B. Social class, self-derogation and deviant response. Social Psychiatry, 13:19-28, 1978.

DRUG	Marijuana; narcotics
SAMPLE SIZE	4,694
SAMPLE TYPE	Junior high school students
AGE	Adolescents
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Houston, Texas
METHODOLOGY	Survey--longitudinal
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Spring 1971, 1972
NO. OF REFERENCES	25

PURPOSE

According to a general theory of deviant behavior, deviant responses result from highly distressful self-rejecting attitudes in one's membership groups. The theory asserts that deviant behaviors are adopted to enhance self-attitudes by attacking the basis of one's self-devaluation, by avoiding experiences that have self-devaluing implications, and by substituting new standards for positive self-evaluation in place of the normative standards against which the self was devalued. The theory also asserts that normative patterns are rejected because of their actual and subjective association with the genesis of earlier negative attitudes toward the self. The present study tested the hypothesis, derived from this general theory, that prior self-derogation is related to subsequent adoption of each of 20 deviant responses among middle class adolescents but not among lower class adolescents. The deviant responses were felt to be compatible with the normative standards of the lower class subculture but were clearly deviant with reference to middle class standards.

METHODOLOGY

Data were collected in the course of a longitudinal survey study of a preadolescent population who responded to the first two annually administered questionnaires. The sample of 4,694 subjects was composed of junior high school students from 18 randomly selected schools in the Houston Independent School District (Texas). The questionnaire was administered in the spring of 1971 and 1972 and contained 209 structured items. Self-derogation was measured by scores on a seven-item scale indicating self-attitudes. Deviant behaviors were defined by self-reports of 20 acts, including stealing, selling narcotic drugs, using alcohol, cheating on exams, fighting, and smoking marijuana. Reports from school personnel were used to validate the self-report data. The adoption of deviant responses was said to have occurred if subjects who reported not performing the act before the first testing reported performing it between the first and second testing. Students whose mothers did not graduate from high school were defined as lower class, while those whose mothers had graduated from high school were defined as middle class. For each of the groupings according to sex and social class, students who were high, medium, and low in self-derogation were compared with respect to the frequency of adoption of deviant behaviors.

RESULTS

For male middle class students, a high initial level of self-derogation was significantly related to subsequent adoption of 15 of the deviant responses. In contrast, for lower class male subjects prior self-derogation was associated with only one of the deviant responses. Comparable results were observed for the females. In 19 of the 20 cases, initial self-derogation was significantly associated with subsequent reports of deviant responses among middle class females. Higher initial levels of self-derogation were associated with high probabilities of subsequent adoption of the deviant response. In contrast, among lower class female subjects only four types of behavior were reported for which the earlier level of self-derogation was significantly associated with subsequent reports of deviant response. For both lower class males and lower class females, subjects with medium self-derogation were slightly more likely to report deviant behavior than were subjects with high self-derogation.

CONCLUSIONS

Results generally indicate that earlier self-derogation is associated with subsequent deviant response among middle class subjects but not among lower class subjects. The relationship between antecedent self-derogation and subsequent adoption of specified deviant behaviors was strongest and most consistent among higher stratum subjects and was least likely to be found among lower stratum subjects. Thus, findings did not support certain theories regarding social class and deviance. Rather, findings were consistent with the view that behaviors that in the middle class subculture are considered deviant are compatible with lower class subcultural systems. Individuals in the lower class subcultures who have severe self-rejecting attitudes would thus be unlikely to adopt such behaviors to alleviate feelings of low self-worth. Instead, they would adopt responses toward the goal of improving self-acceptance that were not associated with the way of life in which severe self-rejecting attitudes were developed. These findings do not imply that lower class subjects are less self-derogating than middle class subjects but that deviant responses are compatible with the values and normative standards of their membership groups.

Kay, E.J.; Lyons, A.; Newman, W.; Mankin, D.; and Loeb, R.C. A longitudinal study of the personality correlates of marijuana use. Journal of Consulting and Clinical Psychology, 46(3):470-477, 1978.

DRUG	Marijuana
SAMPLE SIZE	251
SAMPLE TYPE	College students
AGE	Young adults
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Pennsylvania
METHODOLOGY	Longitudinal survey
DATA COLLECTION INSTRUMENT	Questionnaire; Adjective Check List; California Psychological Inventory
DATE(S) CONDUCTED	1971-1974
NO. OF REFERENCES	14

PURPOSE

Most studies reporting personality differences between marijuana users and nonusers employ data from only one testing and therefore show little about the nature of personality differences before and after drug use or about the consistency of measures over time. Thus, the present study employs a longitudinal design to establish differences between marijuana users and nonusers to assess the consistency of the reported differences in characteristics and to check for personality characteristics and changes in nonusers who became users.

METHODOLOGY

Each fall during the years 1971, 1972, and 1973, 200 randomly selected male freshmen entering Lehigh University in Pennsylvania were solicited for voluntary participation. The various groups of students were then contacted for followup studies in the spring following initial contact and for successive springs up to and including the spring of 1974. Of the original volunteers, 68 of those students entering in 1971, 85 of those entering in 1972, and 98 of those entering in 1973 completed all testing sessions. For each test session, subjects completed a drug questionnaire that included demographic and drug-use information, the Adjective Check List, and the

California Psychological Inventory. According to their responses on the various administrations of the drug questionnaire, subjects were categorized as continuous nonusers, switched nonusers, or users. Switched nonusers were those subjects who did not disclose marijuana use on the initial questionnaire but did disclose it on a later questionnaire.

RESULTS

The results of the initial fall testing replicated the findings of an earlier study of Lehigh students, and the pattern of results endured over time. Compared to continuous nonusers, users were significantly higher in social presence and flexibility and lower on responsibility, socialization, self-control, and achievement via conformance. California Psychological Inventory scores consistently differentiated users and continuous nonusers over time, and switched nonusers fell between the two groups. The switched nonusers were similar to users on the social presence scale and similar to continuous nonusers on the socialization, self-control, and achievement via conformance scales. Switched nonusers shifted on only one scale; they came to resemble the users on flexibility. According to the Adjective Check List scales, users were significantly higher than continuous nonusers on lability, heterosexuality, exhibition, and change. Continuous nonusers were significantly higher than users on self-control, personal adjustment, achievement, endurance, order, autonomy, and deference. The original user-continuous nonuser differences on the 11 scales held up consistently over the 3 study years. However, the relationship of the switched nonuser group to the other two groups changed over time. Many of the Adjective Check List scores of the switched nonusers became more like those of users. The shift from similarity with continuous nonusers to similarity with users is clear on socialization through conformity, lability, autonomy, and change scales. On the order, heterosexuality, and exhibition scales the switched nonusers were consistently similar to users. Finally, 58 of 66 possible cases supported the hypothesis that the significant differences between users and continuous nonusers were in the same direction for the psychological inventory and adjective scales when the two scales are positively correlated and in opposite directions when the two scales are negatively correlated.

CONCLUSIONS

Certain people with specifiable personality patterns fall into the three categories of continued nonusers, users, and switched nonusers. The distinction between users and nonusers is clearest in three personality clusters: conformity, characteristics related to success through conventional means, and adventure seeking. Nonusers tend to be well-socialized, conforming to norms, striving for traditional goals, and rarely acting on impulse. In contrast, users are nonconforming, adventurous, independent, and spontaneous. Furthermore, the switched nonusers are similar to the users in being outgoing, socially self-confident, and spontaneous. This supports the notion that a certain personality type is more likely to use marijuana rather than the idea that marijuana use results in changes in personality.

Contrary to the claims of critics of the California Psychological Inventory, the study found little evidence of shifts in personality results in conjunction with changes in drug use. In contrast, some Adjective Check List scores for switched nonusers exhibited demonstrable shifts over time. Thus, while switched nonusers' self-concepts may be modified after marijuana use, their perceptions of personality traits may remain unchanged.

Kimlicka, T.M., and Cross, H.J. A comparison of chronic versus casual marijuana users on personal values and behavioral orientations. The International Journal of the Addictions, 13(7): 1145-1156, 1978.

DRUG	Marijuana
SAMPLE SIZE	83
SAMPLE TYPE	Chronic users versus casual users
AGE	Young adults
SEX	Both
ETHNICITY	Mostly white
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--comparative
DATA COLLECTION INSTRUMENT	Interviews; Personal Orientation Inventory; Rokeach's Value Survey; Multiple Affect Adjective Check List
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	34

PURPOSE

Generally, the results of studies on chronic marijuana use are ambiguous and demonstrate the importance of matching users and controls on demographic, biological, and social values. A frequent error in marijuana research has been the failure to differentiate between types of users and potencies of the drugs used. The present study compares the values, attitudes, and behavior preferences of chronic and casual marijuana users.

METHODOLOGY

A total of 60 male and 23 female volunteers served as subjects. Most were recruited from a university community by research assistants. Subjects were divided into chronic and casual groups: 52 chronic users (41 male, 11 female) had used marijuana at least once a day for no less than a year, while 31 casual users (19 male, 12 female) reported smoking between 1 and 3 times a week. Measures consisted of an open-ended structured interview, a Personal Orientation Inventory (POI) developed by Shostrom, Rokeach's Value Survey (form D, 1969), and the Multiple Affect Adjective Check List (MAACL) developed by Zukerman et al. All assessment data were tested using two-way analysis of variance for group effect, sex effect, and sex by group interaction.

RESULTS

No significant group differences were found in positive mental health as measured by the POI, although several significant sex differences were evident. Results of the Rokeach Value Survey indicated virtually identical value patterns across groups; significant sex differences were evident. Male chronic users and female casual users ranked inner harmony higher than male casual users and female chronic users. The opposite pattern was true for the value of forgiving. No differences were found for sex, group, or sex by group interaction effects on the anxiety, hostility, or depression scales of the MAACL.

In contrast to casual users, chronic users reported having more marijuana-using friends (and many more heavy marijuana-using friends), knew more people who grew marijuana, began smoking at a younger age, and had used and were continuing to use more illicit drugs more frequently. The typical chronic users spent about one-third of their waking hours intoxicated on marijuana and had done so for a considerable length of time in a variety of life situations. Perceived risks reported by chronic users consisted of possible lung damage and fear of legal punishment. In contrast, casual users tried other drugs mainly on an experimental basis, and many (41 percent) used no other drugs. Casual users also reported a wide range of perceived risks associated with heavy marijuana use (e.g., amotivation, dependence, brain cell damage, and gynecomastia).

CONCLUSIONS

Contrary to expectation, both daily, long-term marijuana users and more casual users appear to be quite similar in moods, values, and positive measures of mental health. However, interview information indicates discordant group composites that seem to reflect differential intensity of involvement in the drug subculture. These findings support research that has linked both increased drug subculture involvement with an increased frequency of marijuana smoking and heavy marijuana use with use of other more powerful illicit drugs. Subjects' similarities appear to be the result of membership in a primary subgroup characterized as young, white, middle class, and university oriented.

Kohn, P.M., and Annis, H.M. Personality and social factors in adolescent marijuana: A path-analytic study. Journal of Consulting and Clinical Psychology, 46(2):366-367, 1978.

DRUG	Marijuana
SAMPLE SIZE	193
SAMPLE TYPE	High school students
AGE	Adolescents
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	8

PURPOSE

The present study evaluates a multivariate model of youthful marijuana use. The model assumes that use or nonuse reflects individuals' attitudes toward marijuana use. Attitudes, in turn, depend on the perceived functions of marijuana use. The present model includes the functions of symbolic protest against conventional society and of seeking acceptance from permissive peers. The model also incorporates the personality variables of general left-right sociopolitical outlook and internal sensation seeking. Sociopolitical outlook should affect the symbolic protest function because expressing disidentification with conventional society should appeal specifically to rebellious persons. Both personality factors should influence the peer-acceptance function because individuals' own attitudes and practices should predispose them to seek acceptance from similarly inclined peers. Finally, both personality variables should affect attitude.

METHODOLOGY

Questionnaires were administered to 96 male and 97 female high school seniors. Measures were frequency of marijuana use over the past 6 months; a brief modified version of Wilson and Patterson's Conservatism Scale, which measures sociopolitical outlook; the Internal Sensation-Seeking

subscale from a modified version of Pearson's Novelty Experiencing Scale; and specially constructed measures for attitude toward marijuana use, the peer-acceptance function, and the symbolic protest function. Path analysis, a multiple-regression procedure for testing the implications of causal models, was applied to the data.

RESULTS

The path diagram produced strongly resembles the one implied by the model proposed. The sole discrepancy is the absence of a significant path coefficient between internal sensation seeking and the peer-acceptance function. Because internal sensation seeking is not a publicly visible trait, it may not be able to affect interpersonal attraction except in very close relationships. The model explains about 33 percent of the variance in marijuana use and about 45 percent of the variance in attitude. The overidentification test statistic indicates that the model fits the data well. Further evidence of success comes from comparisons of the observed correlations with those predicted by the model through summing direct causal, indirect causal, and noncausal contributions. Predictive errors are nonsignificant, and separate path analyses for each sex are similar.

CONCLUSIONS

In general, the results support the model. The variance accounted for in attitude and behavior is high enough to prove the importance of the predictors selected but low enough to suggest the need for extending the model. A revised model should include the perceived dysfunction of the various health-related and social-legal risks ascribed to marijuana use and the related personality variable of risk-taking propensity. Longitudinal research permitting stronger causal inferences also seems desirable.

Lucas, W.L. Predicting initial use of marijuana from correlates of marijuana use: Assessment of panel and cross-sectional data 1969-1976. The International Journal of the Addictions, 13(7):1035-1047, 1978.

DRUG	Marijuana
SAMPLE SIZE	211
SAMPLE TYPE	College students
AGE	Not specified
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Statistical analysis
DATA COLLECTION INSTRUMENT	Survey statistics
DATE(S) CONDUCTED	1969, 1971, 1973, 1976
NO. OF REFERENCES	16

PURPOSE

Variables that past research has indicated to be related to marijuana use are sex, opportunity for use, attitude toward marijuana, and friends' use of marijuana. Such factors are generally assumed to indicate socialization processes within marijuana-using cultures that account for personal use of the drug. However, these explanations may not account for initial use of the drug, as the data may have included various stages in the drug use career. The present study focused on the initial use of marijuana and tried to answer three questions: (1) Which variables associated with marijuana use are most relevant to predicting initial use? (2) Do these variables also predict initial use over time? (3) Do any of these variables operate in combination to predict initial marijuana use?

METHODOLOGY

Data from two research projects using college students from different universities were used in the analysis. The longitudinal research used a panel design in which information was collected from the same 103 individuals in 1969, 1971, and 1973. The cross-sectional research collected information from 108 individuals in 1976. The panel group subjects were not using marijuana at

the time of the initial interview, but the cross-sectional group included both users and nonusers of marijuana. Variables chosen for study had been shown in previous research to be related to marijuana use. Independent variables were sex, age, educational attainment, occupational status, exposure to close marijuana-using friends, and the chance to use marijuana. Other variables were the expressed desire to try marijuana, tolerant attitude toward marijuana use, changes in attitude toward marijuana use, and beliefs causing hesitancy to try marijuana. Marijuana use was the dependent variable.

RESULTS

A total of 25 percent of the respondents to the panel study and 60 percent of the cross-sectional respondents reported marijuana use. Three-quarters of the panel study respondents and 40 percent of the cross-sectional group reported never using the drug. Tolerant attitude toward marijuana use and chance to use marijuana were the two variables from the 1969 data that were relevant to predicting initial use of marijuana by 1971. Tolerant attitude, educational attainment, and chance to use marijuana were the three variables from 1971 that were relevant to the prediction of initial use by 1973. Analysis of the cross-sectional data indicated five relevant predictive variables: expressed desire to try marijuana, tolerant attitude toward marijuana use, exposure to close marijuana-using friends, younger age, and absence of beliefs causing hesitancy to try marijuana. The only variables that consistently predicted initial marijuana use were tolerant attitude toward marijuana use and chance to use marijuana. Only the tolerant attitude variable predicted first use in both the study groups, but it was a stronger predictor in the panel sample. None of the relevant variables from the two sets of data operated in combination to predict marijuana use.

CONCLUSIONS

Findings indicated that the salience of the variables for predicting initial marijuana use changed over time. The factors associated with marijuana users or using groups were not necessarily predictive of the first use of the drug; thus, factors explaining why someone begins using marijuana may differ from factors explaining why someone continues to use the drug. Consequently, prevention programs must keep abreast of changing factors that relate to use and must alter their approaches as necessary. Prevention should focus on younger individuals, try to reduce the desire to try marijuana, foster less tolerant attitudes toward use, discourage friendships with users, and promote beliefs that would make youths hesitate to try the drug. However, manipulation of these factors raises both ethical and practical problems for prevention programs, considering the numbers and types of factors related to marijuana use. These programs should focus on manipulating factors that may indirectly effect initial marijuana use. While this research identified several factors related to the initial use of marijuana, much of the variance in initial use was not explained. Further research to identify other factors and using larger samples is needed.

Mellinger, G.D.; Somers, R.H.; Bazell, S.; and Manheimer, D.I. Drug use, academic performance, and career indecision: Longitudinal data in search of a model. In: Kandel, D.B., ed. Longitudinal Research on Drug Use: Empirical Findings and Methodological Issues. Washington, D.C.: Hemisphere, 1978. Pp. 157-177.

DRUG	Marijuana; multidrug
SAMPLE SIZE	834
SAMPLE TYPE	College students
AGE	17 to 21 years
SEX	Male
ETHNICITY	White; Asian
GEOGRAPHICAL AREA	Berkeley, California
METHODOLOGY	Longitudinal--panel
DATA COLLECTION INSTRUMENT	College and high school transcripts; Scholastic Aptitude Test scores; questionnaires
DATE(S) CONDUCTED	1970; 1973
NO. OF REFERENCES	32

PURPOSE

Public concern about possible amotivational effects of using marijuana as well as other drugs is widespread. An amotivational syndrome of apathy, mental confusion, and lack of goals is considered to be inconsistent with academic success in a competitive academic setting and with the process of finding a self-fulfilling and coherent sense of identity. The present study attempts to determine whether a relationship exists between drug use and academic performance or career aspirations among college students and whether such a relationship is independent of family background, prior scholastic performance and aptitude, and values at the onset of college.

METHODOLOGY

The study sample consisted of 834 men entering the University of California at Berkeley in fall 1970. Their ages ranged from 17 to 19; 82 percent were white and 12 percent Asian. They came from middle income families and most had exceptionally good high school grades. Data from the freshman cohort were collected both early in their freshman year through interviews and self-administered forms (time 1) and in the spring of 1973 by self-administered mailed

questionnaires (time 2). Only the 611 men still enrolled in the university in spring 1973 were included in the grade-point analyses.

Academic performance was measured using data on grades from university records and high school transcripts. University transcripts for the academic years 1970-1971 through 1972-1973 were collected for 93 percent of the 611 men in this analysis. In other cases, grades were approximated or self-reported grades accepted. Respondents' scores on the Scholastic Aptitude Tests for mathematical and verbal aptitude were used as indicators of the inherent level of aptitude. The high school grade-point average (GPA) served as a crude indicator of level of performance reflecting aptitude as well as motivational and institutional factors.

In both waves of the study, drug-use data were obtained from a self-administered questionnaire; questions about drug use were asked in an identical fashion each time. Drug classes asked about were marijuana, hashish, or both; psychedelics; cocaine; heroin; opium; other opiates; inhalants; amphetamines and other stimulants; and barbiturates and sedatives. Students were asked whether they had ever used any of the drugs, how long ago they first and last used, and how many times they had used in the last 2 months.

Analysis focused on the consequences rather than the antecedents of drug use. Strategy I was concerned with whether drug-use status at time 1 predicted time 2 outcome criteria as measured by GPA and career indecision and whether drug users differed in these respects from nonusers. Two regression analyses were undertaken for each of the criteria of academic performance and GPA. Strategy II involved four regression analyses with the same two outcome criteria but different drug predictors. In the final step of the analyses the two strategies were combined.

In classifying drug users, multiple users were distinguished from men who used only marijuana, and each group was contrasted separately with men who never used drugs. Two further kinds of variables were distinguished: drug-use status at time 1 and continuing drug use by time 2.

RESULTS

Illicit drug use was widely prevalent in the population studies. By time 2, 78 percent of the men had used drugs at least once and only 22 percent had never used any drugs. At time 1, 55 percent had used drugs during the past 6 months; this figure had risen to 61 percent by time 2. At each point more men were using only marijuana than were using other drugs as well. By time 2, however, 39 percent had used other drugs at some time and almost exactly as many had used only marijuana. The high use rates on the Berkeley campus do not differ from the average nationally at similar schools.

Regression analysis with the predictors of family background, scholastic aptitude/academic performance, and major/vocational orientation at time 1 indicated that the somewhat higher grades of drug users could be explained by prior characteristics of those users. Analysis of continuing drug users, however, showed a moderate positive correlation between continuing use of only marijuana and time 2 grades, which was not explained by other predictors.

Multiple drug users appeared to be doing less well than nonusers by time 2 and were more likely than nonusers to be uncertain about career goals, although the differences were reduced to insignificance upon regression analysis. Differences between continuing multiple drug users and nonusers were related to other values that emphasized the conventionality of nonusers, as distinguished from the countercultural orientation of the continuing multiple drug users. Men in the time 1 marijuana-only group and in the continuing marijuana-only group were more likely than expected to be clear about occupational goals, given their initial unconventionality and relative lack of career orientation. A small group of 22 continuing multiple drug users with clear career goals at time 1 were somewhat more likely than nonusers to be undecided about their career goals by time 2, even after controlling for other variables. Although the difference is of marginal significance, drug use retains a slight independent effect. In addition, continuing multiple drug users with unclear career goals at time 1 were slightly but insignificantly more likely than nonusers to be unclear about occupational goals by time 2.

CONCLUSIONS

For most users, no evidence was found that the generally moderate patterns of marijuana or other drug use prevailing in the university setting have any negative consequences that are independent of other prior characteristics of users compared with nonusers. However, among two small subgroups of continuing multidrug users, adverse outcomes could not be explained in terms of prior characteristics. The possibility that drug use has some causal influence on these outcomes could not be ruled out. If drug use does play a role in the outcomes for continuing multiple drug users with initially clear occupational goals, it remains unclear whether heavy marijuana use, use of other drugs, or involvement in the drug subculture is the crucial factor. Favorable outcomes associated with drug use warrant further investigation. Finally, findings suggest that users and nonusers may differ in personality characteristics not included in the present analyses and that nonusers may be out of step in the large, liberal, intellectually challenging university community in which drug use is an integral part of the lifestyle.

Mendhiratta, S.S.; Wig, N.N.; and Verma, S.K. Some psychological correlates of long-term heavy cannabis users. British Journal of Psychiatry, 132:482-486, 1978.

DRUG	Marijuana
SAMPLE SIZE	75
SAMPLE TYPE	Users versus nonusers
AGE	Adolescents; young adults; mature adults
SEX	Male
ETHNICITY	Indian
GEOGRAPHICAL AREA	India
METHODOLOGY	Exploratory/descriptive survey
DATA COLLECTION INSTRUMENT	Psychological tests; Wechsler's Adult Intelligence Scale; Bender Visuo-Motor Gestalt test; Maudsley Personality Inventory
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	26

PURPOSE

Although many studies have focused on the psychological effects of acute intake of cannabis, few studies have examined the psychological changes following heavy and long-term use. In addition, the use of alcohol and other drugs by cannabis users in Western cultures makes it difficult to isolate the effects of cannabis. In India, however, cannabis in its various forms has been used traditionally for centuries. Although some Indian States have banned cannabis products, use of the drug is socially accepted and continues largely as a result of the wild growth of the cannabis plant. Most users take cannabis without much use of other drugs, and the route of intake (smoking or ingestion) is fairly well fixed. The present study examined long-term Indian cannabis users to determine the long-term physical, psychological, and psychiatric effects on the individual.

METHODOLOGY

Fifty Indian males who had taken cannabis at least 25 days per month for more than 4 years constituted the study population. Half the subjects were drinkers of "bhang," a common drink made with cannabis leaves; the others were smokers of "charas/ganja" (a combination of the resinous

material and flowering tops of the plant). The bhang had 1 percent THC and the charas/ganja had 3 percent THC; thus the average daily dose was about 150 mg of THC. The control group consisted of 25 psychiatrically normal persons of comparable age, sex, education, and occupation. Both the experimental and control groups were from poor socioeconomic groups and were nearly all illiterate. Subjects were given psychological tests measuring psychomotor, perceptual, and other variables. Tests included digit span tests from the Wechsler Adult Intelligence Scale, a design recognition test, a pencil tapping test, speed and accuracy tests, a time perception test, a reaction time test, the Bender Visuo-Motor Gestalt test, the Maudsley Personality Inventory short scale, and the size estimation test. To eliminate acute drug effects from the test results, subjects were given the tests after a minimum period of 12 hours without drugs.

RESULTS

The control group almost always gave the best performance on all the tests. The charas group showed a poorer performance than either bhang drinkers or controls, except on the digit span backward test and the Bender test, where the charas smokers did better than the bhang drinkers. The differences between the two cannabis groups were not statistically significant, however, except for the pencil tapping and time perception tests. On eight of the nine tests, the controls were significantly different from the users, particularly the charas smokers. Both the long duration of use and heavy use appeared to contribute to this result.

CONCLUSIONS

Cannabis users reacted more slowly than the nonusers and were also poorer in concentration and time estimation. In addition, users had higher neuroticism and greater perceptual-motor disturbance than nonusers. The charas smokers were the poorest performers and also showed poor memory, lowered psychomotor activity, and poor size estimation. Although comparisons with other research is difficult, similar results have been found by Soueif, Beaubrun, Knight, and others. Since the tests were given after a 12-hour drug-free period, they should have overcome any short-term effects of the drug. Thus, the present study's finding of a significant reduction of the concentration score could be attributed to the cumulative effect of chronic drug use.

Mercer, W.G.; Hundleby, J.D.; and Carpenter, R.A. Adolescent drug use and attitudes toward the family. Canadian Journal of Behavioural Science, 10(1):79-90, 1978.

DRUG	Marijuana; tobacco; alcohol
SAMPLE SIZE	286
SAMPLE TYPE	Ninth grade students
AGE	Adolescents (mean age: 14.7 years)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Ontario, Canada
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Overall Family Attitude Measure
DATE(S) CONDUCTED	Spring 1974
NO. OF REFERENCES	23

PURPOSE

Attempts to present a systematic description of family characteristics as they relate to drug use among adolescents are rare. Such research has been hindered by difficulties in measuring complex parent-child relationships with only a few dimensions and by failure to perceive the family as an interactive unit rather than separate individuals. The present study seeks to develop empirically global measures of the adolescent's perception of the family as a unit or whole and to relate the dimensions of this perception to use of alcohol, tobacco, and marijuana.

METHODOLOGY

The Overall Family Attitude Measure (OFAM) was developed by searching the literature for concepts useful in characterizing the family or related to adolescent drug use. The 21 concepts selected included achievement orientation, active recreational orientation, caring control, cohesiveness, conflict, control, expressiveness, family communication, and family organization. Other concepts were importance of extended family, independence, intellectual-cultural orientation, pleasure in each others' company, moral-religious emphasis, normlessness, parental attitudes to drug use, parental disparity in word and deed, parental deprivation, parental affection for each

other, trust, and parental concern for offspring. A pool of 63 items was then developed to tap these concepts. The response format was a 5-point Likert scale ranging from strongly agree to strongly disagree. In the spring of 1974 an anonymous questionnaire containing the 63 OFAM items and criterion drug use items was administered to a total of 123 male and 163 female ninth grade students (mean age 14.7 years) in 6 public and 1 Catholic school in semirural southern Ontario, Canada. The items concerning drug habits measured alcohol, tobacco, and marijuana use over the previous 6 months. The OFAM items were factored and interpreted. These factors were then used to produce factor scores that were related to the drug-use criteria employing correlational and regression techniques.

RESULTS

The items of the OFAM questionnaire were intercorrelated, and six iterative principal axes were extracted. The six factors tapped the following dimensions: the family's warmth, support of and interest in the child, the family's degree of organization, the family's disinterest in the child, the parents' togetherness, the extent to which the family was unsocial and kept to itself, and the extent to which the family was excitable. Interfactor correlations were generally low, and the significance of certain factors was unclear.

Regarding alcohol use during the previous 6 months, 22 percent of the females and 25 percent of the males had not used alcohol, 45 percent of the females and 30 percent of the males had used alcohol one to five times, and 33 percent of the females and 45 percent of the males had used alcohol more than five times. For the same period, 50 percent of the females and 42 percent of the males had not used tobacco, 17 percent of the females and 16 percent of the males had used it one to five times, and 33 percent of the females and 42 percent of the males had used tobacco six or more times. Finally, within 6 months of testing 89 percent of the females and 72 percent of the males had not used marijuana or hashish, 6 percent of the females and 15 percent of the males had used it one to five times, and 5 percent of the females and 13 percent of the males had used the drug more than five times.

Separate regression analyses were carried out for each gender because males generally used more drugs than females and because drug use and parent-child relationships differed between the sexes. For males, warmth, support, and interest in the child related negatively and significantly to the use of tobacco and alcohol, while for females this factor related negatively and significantly to the use of all three drugs. For females, an unsocial family related negatively and significantly to the use of marijuana. The entire set of OFAM variables produced regression equations that were statistically significant in explaining the variance in the use of all three drugs for females but only in the use of tobacco for males. Correlations between the three drug use measures were moderately high.

CONCLUSIONS

While OFAM dimensions represent empirically based factors of the child's perception of the family as a unit, the particular items in the measure and the clarity of the dimensions themselves need improvement. Based on multiple regression analysis, findings indicate that the overall family social environment as measured by the OFAM explains relatively little variance (i.e., 5 to 17 percent) in the use of alcohol, tobacco, and marijuana by adolescents, although family environment appears to be a more powerful correlate of drug use for females than for males. Warmth, support, and interest in the child is the most influential OFAM dimension. For females, the family's disinterest in the child correlates positively with marijuana use. These findings make apparent the need for a broad, integrative approach to the problem of adolescent drug use and its relationship to the family.

Miller, L.; Cornett, T.; and McFarland, D. Marijuana: An analysis of storage and retrieval deficits in memory with the technique of restricted reminding. Pharmacology Biochemistry and Behavior, 8(4):327-332, 1978.

DRUG	Marijuana
SAMPLE SIZE	12
SAMPLE TYPE	Experienced users
AGE	Young adults (range: 21 to 30)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Word lists; observations; physical examinations; laboratory tests; MMPI; interviews; drug potency/pleasantness scale
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	16

PURPOSE

Studies of marijuana's effects on memory have variously suggested that the drug affects storage, output, and retrieval aspects of the memory process. These studies have been based largely on free recall verbal learning studies, in which lists of items have been repeatedly presented. However, this technique does not permit the evaluation of storage and retrieval processes because the immediate recall of an item does not show that the item was in the long-term memory. An item can be considered to be in long-term memory only when it is recalled without repeated presentation.

This study used the technique of restricted reminding to evaluate the effect of marijuana on storage, retention, and retrieval processes simultaneously. This technique differs from the free-recall technique in that only words not recalled are presented on each subsequent trial.

METHODOLOGY

The subjects were 12 male volunteers who were experienced marijuana users. Their use ranged from two to four times a week to a few times per month. They ranged from 21 to 30 years of age and were determined to be healthy (based on physical examinations, laboratory tests, the MMPI, and interviews).

The subjects were asked to refrain from smoking marijuana for 4 days prior to the testing, which took place on two occasions a week apart. Half the subjects received marijuana in the first testing session and a placebo in the second session. The reverse procedure was used for the other six subjects. The subjects were randomly assigned to the marijuana or placebo condition and served as their own controls. Each smoked a single 500 mg cigarette containing 21 percent THC or a placebo cigarette. The smoking lasted for 7 to 10 minutes. Pulse rates were taken before smoking, immediately after smoking, 15 minutes after smoking, and at the end of the session. After the testing the subjects also rated the intensity and pleasantness of the "high" on a scale of 0 to 100.

The instrument for the memory evaluation consisted of two similarly constructed 30-item word lists consisting of common objects from the Thorndike-Lorge norms. The subject was required to recall it in writing. The experimenter read the list of words at a rate of 1 every 3 seconds. Only the words not recalled were repeated to the subject on the next trial. The recall testing was conducted individually and continued for 12 trials. This method is called "restricted reminding," as it allows for the simultaneous evaluation of storage and retrieval without confounding due to continuous presentation. Items recalled spontaneously without having been presented following initial recall were assumed to have been encoded in long-term memory.

RESULTS

Pulse rates increased significantly following marijuana intoxication and began to return to baseline levels at 65 minutes after smoking. The ratings of potency and pleasantness were significantly greater for the marijuana condition than for the placebo condition.

Subjects required significantly more trials to initially recall all items at least once when intoxicated compared to after taking the placebo. The total number of items retrieved from long-term memory increased under both treatment conditions. However, subjects retrieved more items from storage when in the placebo condition than when in the marijuana condition.

The inconsistency with which words were recalled in the drug condition was the most striking difference between the marijuana condition and the placebo condition. Marijuana produced significantly more memory lapses or recall failures during the retrieval of items from long-term memory. Although most items in long-term storage were eventually retrieved, significantly more items were not recovered in the marijuana condition than in the placebo condition. Subjects in the placebo condition more consistently recalled items from trial to trial, while those in the marijuana condition were marginally superior in eventually recalling items that had been recalled inconsistently for a number of trials.

The placebo and marijuana conditions produced similar results regarding random retrieval, which consisted of items retrieved from random storage. Marijuana use also increased the number of errors resulting from the recall of words not on the list.

CONCLUSIONS

A person intoxicated with marijuana can eventually store the same amount of information as in the placebo state, provided that repeated recall attempts are permitted. However, marijuana intoxication is associated with poorer retrieval characterized by recall lapses, which may reflect a lowered ability to integrate material in memory for recall.

Paton, S.M., and Kandel, D.B. Psychological factors and adolescent illicit drug use: Ethnicity and sex differences. Adolescence, 13(50):187-200, 1978.

DRUG	Marijuana; multidrug
SAMPLE SIZE	8,206
SAMPLE TYPE	High school students
AGE	Adolescents
SEX	Both
ETHNICITY	Black; white; Puerto Rican
GEOGRAPHICAL AREA	New York
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Fall 1971
NO. OF REFERENCES	33

PURPOSE

Any attempt to comprehend the origins of and influences on adolescent illegal drug use cannot ignore the psychological factors involved. However, research seeking to link use of marijuana and other drugs to such factors as depression has proved inconclusive. The present study investigates the relationship of the psychological factors of depression, normlessness, sense of isolation, and self-esteem to drug use. Particular attention is devoted to these relationships in subgroups of adolescents with varying sociodemographic characteristics and patterns of drug use.

METHODOLOGY

Data were derived from a multiphasic random sample of 8,206 adolescents drawn from 18 public secondary schools in New York State. The two-stage sampling procedure involved selection of a stratified sample of high schools and a sample of students clustered by homerooms and stratified to represent the different grades within each school. Of the 18 schools, 6 were located in New York City, 6 in suburban areas, and 6 in small towns or rural areas in upper New York State. In the fall of 1971, structured, anonymous, self-administered questionnaires were filled out by

students in a sample of homerooms in 13 schools and by the entire student body in 5 schools. The sample was weighted to reflect the variable probabilities of selection of schools and homerooms and the response rate in each school.

Adolescents were asked how often they had used each of 11 classes of illegal substance ranging from marijuana to heroin. Respondents were then classified as nonusers, users of cannabis only, and multiple drug users. Adolescents were also asked a series of questions designed to evaluate their psychological condition. Depressive mood was measured by an index of six items (i.e., exhaustion, sleeplessness, sadness, hopelessness, nervousness, and excessive worrying). Normlessness was expressed as the average score index on four items taken from Dean's normlessness subscale. Social isolation was measured by a single item from Dean's social isolation subscale, and self-esteem was assessed by asking respondents if they desired to change themselves.

RESULTS

Each of the four psychological factors is positively related to illicit drug use, although the influence of social isolation and self-esteem appears weak. The relationship between these psychological factors and illicit drug use appears especially strong among the multiple drug users. In contrast, no relationship was found between the four psychological variables and frequency of marijuana use. Depressive mood and normlessness have independent and additive effects on the use of illicit drugs other than marijuana, especially at the high end of the scale. In contrast, the effects of social isolation and self-esteem are both substantially reduced and become inconsistent when depressive mood and normlessness are controlled. However, the effects of depressive mood and normlessness are independent of the effects of social isolation and self-esteem.

Rates of drug use vary among different subgroups of adolescents, defined on the basis of various sociodemographic characteristics such as sex, age, or ethnic background. Boys are slightly more likely to use drugs other than marijuana than are girls, older students are more likely to use drugs than are younger students, and ethnic differences exist in the choice of drugs used. Girls are more likely than boys to fall into the depressed, lonely, and normless categories than boys. Puerto Ricans tend to be more depressed and more normless than either whites or blacks. Given these tendencies, the relationship between psychological factors and use of multiple drugs must be examined while controlling for demographic characteristics. The relationship between depressive mood and multiple drug use proves stronger for girls than for boys. Furthermore, controlling for ethnic background, the relationship between depression and multiple drug use disappears for blacks and Puerto Ricans but remains for whites. For black and Puerto Rican youths, social context rather than intraindividual psychological states may be the most important determinant of drug usage.

Analysis of the joint effects of sex and ethnicity on the relationship of depressive mood to multiple drug use reveals striking correlations. Among whites, depressive mood is still positively related to multiple drug use among boys and girls, with the effect stronger among girls. Among blacks and Puerto Ricans, however, the relationship is negative for boys but positive for girls. Similarly, controlling for ethnicity and sex simultaneously indicates that among blacks and whites an originally positive relationship between normlessness and drug use is reduced, except among white girls. Among Puerto Ricans, low normlessness is correlated to multiple drug use for boys, while no relationship exists between normlessness and drug use for girls.

CONCLUSIONS

The psychological factors of depression and normlessness have a positive, if moderate, effect on the use of drugs, especially illicit drugs other than marijuana, in an adolescent population. Associations of social isolation and self-esteem with drug use are also evident but weak. These psychological factors are related almost exclusively to the use of multiple drugs and not to the use of cannabis alone. Moreover, the association of depression and normlessness with multiple drug use is affected by sex and ethnicity. Depressive mood appears to play a more important role in the involvement in illegal drugs for adolescent girls than for adolescent boys. Furthermore, the relationship of psychological factors to adolescent drug use varies according to social and cultural differences of ethnic groups. However, these findings fail to indicate clearly whether these psychological states precede the use of illicit drugs or are consequences of such use.

Rinder, I.D. The effects of marijuana: A social psychological interpretation. Psychiatry, 41(2): 202-206, 1978.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Theoretical-critical review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	8

PURPOSE

Because of marijuana's growing use and possible future decriminalization, the effects of marijuana have become a topic of great concern. Deliberations about effects tend either toward the view that marijuana turns all users into vicious criminals or toward the view that marijuana affects each individual differently. Between these poles lies the reality of patterned variability. In the present study, the author examines the marijuana user as a social psychological actor. The major hypothesis is that marijuana use results in an intensification of the sense of self.

SUMMARY

As with alcohol, light marijuana use may lead to conviviality, but heavy ingestion causes privatization. Unlike the alcohol user, however, the marijuana user participates in the experience. The actor's perceptual field is narrowed to sharpen the focus on the actor's chosen vector of attention. The subjective drug effect of major social psychological consequence is the intensification of the sense of self as knower and as feeler. This is the meaning of "being high." The danger to marijuana users without defined social roles, work habits, or criteria of performance

is that they may come to have an exaggerated, unrealistic sense of their prowess as producers and creators. To oversocialized individuals whose sense of community has overwhelmed their autonomous selves, intensely experiencing the self permits them to renew the option "to become their own persons" at the expense of growth in social sensitivity and responsibility.

Marijuana has become popular in an era when numerous oversocialized middle class youths are seeking to unencumber their inner selves. They either have good or bad experiences with marijuana, which result from the simultaneous existence within the self of a good me and a bad me. These psychologically switched-on persons should be encouraged to negotiate their needs and drives outside the self and the central nervous system where numerous tasks for survival and adaptation remain.

CONCLUSIONS

The self-intensifying effects of marijuana are neither an unequivocal curse or a blessing. For the well-adjusted person, marijuana use represents a recreational option offering mild euphoria, a sense of freedom, and extraordinary effects. For the maladjusted individual, the marijuana experience may become an illusory escape that is more attractive than ordinary life. Psychological addiction may result from the absence of reality-based rewarding opportunities to experience the self in users' everyday lives. Thus, it is not the drug but individual personality factors that determine the patterns and even the effects of marijuana use.

Smith, G.M., and Fogg, C.P. Psychological predictors of early use, late use, and nonuse of marihuana among teenage students. In: Kandel, D.B., ed. Longitudinal Research on Drug Use: Empirical Findings and Methodological Issues. Washington, D.C.: Hemisphere, 1978. Pp. 101-113.

DRUG	Marijuana
SAMPLE SIZE	651
SAMPLE TYPE	Junior and senior high school students
AGE	Adolescents
SEX	Both
ETHNICITY	Mostly white
GEOGRAPHICAL AREA	Boston, Massachusetts
METHODOLOGY	Survey--longitudinal (cohort); comparative; correlational
DATA COLLECTION INSTRUMENT	Questionnaires; school records
DATE(S) CONDUCTED	1969-1973
NO. OF REFERENCES	24

PURPOSE

In studying drug use among teenagers, investigators have considered such factors as frequency of use, age at first use, reasons for use, consequences of use, and combinations of such factors. The present study used data from a longitudinal study on the causes and effects of teenage drug use. It was designed to predict precocity of marijuana use in a sample of 651 students in 1 of the 6 school systems involved in the larger study.

METHODOLOGY

In the larger study of 12,000 to 14,000 students, subjects were recruited on a schoolwide basis and were studied each year from 1969 to 1973. Participation was voluntary. Data were collected on personality, grade-point average, and cigarette smoking. In the 1971, 1972, and 1973 testings, the cigarette attitude questionnaire was deleted and drug questionnaires were added. Students were asked about the frequency and time of onset of use of marijuana and hashish use.

The 651 students used as the basis for analysis in this study were 7th or 8th graders in 1969 and 11th or 12th graders in 1973. All reported that they were nonusers of marijuana in 1969.

The early users were 128 students who began using marijuana as 9th graders or earlier, late users were 317 students who began marijuana use as 10th graders or later, and nonusers were 206 who remained nonusers through the 5th year of the study. The study tried to determine which preuse psychosocial variables differentiated the three groups and how successfully they could be differentiated.

Items in the 400-item personality questionnaire were designed to measure personal competence and social responsibility, based on traditional middle class values. The eight scales used were (1) obedient, law-abiding; (2) works hard and effectively; (3) capable; (4) confident academically; (5) self-sufficient; (6) likes school and intellectual activities; (7) ambitious; and (8) feels valued and accepted. Students also rated their peers on each of 20 personality traits. Grade-point averages, obtained from school records, were standardized. Cigarette use and attitudes were determined by self-report questionnaires.

RESULTS

Whether evaluated by self-report or by peer rating procedures, nonusers scored highest, early users scored lowest, and later users scored in between on the variables measuring traits of personal competence and social responsibility. The pattern of intermediate scores for late users held for all 37 preuse predictor variables studied, although the mean of the late users was closer to that of the nonusers on peer ratings of emotionality and was closer to that of early users on peer ratings of sociability. On cigarette smoking and favorability of attitudes toward cigarette smoking, early users scored highest and nonusers scored lowest. On grade-point average, nonusers scored highest and early users scored lowest. A concurrently published analysis of data on 2,249 high school and junior high school students showed that rebelliousness, poor academic performance, cigarette smoking, and favorable attitudes toward cigarette smoking are associated with increased likelihood of subsequent use of illicit drugs. These variables also predicted subsequent levels of illicit drug use. The current study shows that those same variables distinguish between who will be early users, who will be later users, and students who will remain nonusers.

CONCLUSIONS

Findings agree both with a concurrent study and with an earlier study by Jessor and others. Results indicate that the precocity of marijuana use can be predicted from psychosocial variables similar to those predicting degree of subsequent drug involvement. The earliest use is associated with low scores on preuse measures of personal competence, social responsibility, and academic performance, and with high scores on preuse measures of emotionality, cigarette smoking, and favorable attitudes toward cigarette smoking. In addition, on most of the variables studied, the scores for those who began use late is about midway between the means for early users and for nonusers. Findings showed sufficient predictive accuracy to justify further study of the theoretical and practical implications of these and related longitudinal relationships.

Teale, J.D.; Clough, J.M.; King, L.J.; and Marks, V. The incidence of cannabinoids in fatally impaired drivers: An investigation by radioimmunoassay and high pressure liquid chromatography. Journal of the Forensic Science Society, 17(2-3):177-183, 1978.

DRUG	Cannabis
SAMPLE SIZE	66
SAMPLE TYPE	Accident victims
AGE	17 to 27 years
SEX	Not specified
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Surrey, England
METHODOLOGY	Exploratory/descriptive survey
DATA COLLECTION INSTRUMENT	Laboratory reports/examinations
DATE(S) CONDUCTED	July 1976 to April 1977
NO. OF REFERENCES	10

PURPOSE

Studies of the effects of drugs on driving capabilities indicate that drugs may be more deeply involved in fatal road accidents than has been recognized. However, while blood alcohol levels can be measured to assess impairment of driving ability, no such test exists for many other drugs, among them cannabis. The present study uses a radioimmunoassay (RIA) technique to estimate the extent of involvement of cannabis in fatal highway accidents by screening blood samples from fatally injured drivers.

METHODOLOGY

The sample consisted of 65 blood specimens from fatally injured drivers (54 automobile drivers and 11 motorcyclists) received by the Department of Biochemistry, University of Surrey (England) and of one other specimen from a motorcyclist received at the Home Office Central Research Establishment. Specimens were sent between July 1976 and April 1977 by coroners in England and Wales. Upon receipt, blood samples were centrifuged and the supernatants separated for storage at -20°C. Aliquots of methanolic supernatant were assayed initially by direct addition to the RIA system.

Results were expressed in tetrahydrocannabinol cross-reacting cannabinoids (THC-CRCs). Blood samples regarded as positive for the presence of cannabinoids were examined further by the use of high pressure liquid chromatography (HPLC). Column fractions were assayed by direct addition of aliquots to the RIA system. The THC was identified and quantified by this method.

RESULTS

Six samples were regarded as positive for THC-CRCs. All were from young males (17 to 27 years). Only one of the six showed evidence of blood alcohol. Two samples were not investigated further; THC-CRC levels in a third sample were considered too low for HPLC separation. The levels of THCCRCs in the other samples were considered moderate compared with the limited data previously available.

While low levels of cannabinoids may not have been picked up by the test, it appeared unlikely that very low THC-CRC levels would be associated with the degree of intoxication associated with impairment of driving ability. Similarly, in the moderate cases cannabis would not at first sight appear to be the probable cause of driving impairment. In one case, a high blood alcohol level was more likely to be the reason. Nevertheless, the blood level of cannabinoids at the time of the accident may have been higher than that detected in a sample taken several hours afterward and after a blood transfusion.

The picture was complicated further by variation in psychoactive cannabinoid composition in similar total THC-CRC levels. Intoxication has been linked to the THC component of blood cannabinoids. Thus, the relatively low THC-CRC level observed in one case may have been more intoxicating than higher levels in two other cases by virtue of a higher THC content. The high level of THC in this particular case may also have reflected the time the blood sample was taken, soon after the accident and before the subject's death.

The minimum apparent incidence of cannabis involvement in 66 fatal road accidents was 9 percent. This figure cannot, however, be generalized because the sample used was not representative in terms of victims' age or geographical distribution.

CONCLUSIONS

The use of RIA is of proven value in the sensitive and rapid detection of cannabis use. When followed by a HPLC separation system, the capacity of the RIA for the measurement of THC and its cross-reacting metabolites confers greater specificity on the technique. As the survey cases illustrate, it is sometimes difficult to relate THC levels to degrees of intoxication. However, much broader survey of cannabis involvement in all accidents should be undertaken to ascertain the extent of its use, especially since the more potent cannabis preparations becoming popular may raise intoxication levels.

Weinstein, R.M. The avowal of motives for marijuana behavior. The International Journal of the Addictions, 13(6):887-910, 1978.

DRUG	Marijuana
SAMPLE SIZE	240
SAMPLE TYPE	College students
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Exploratory/descriptive survey
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	33

PURPOSE

Much of the data regarding statements of motives for using or not using marijuana are qualitative in nature and thus not useful. Quantitative data on avowed marijuana motives are limited by the restricted range of motivations studied, lack of comparability among the quantitative findings, and absence of a theoretical frame of reference. This paper presents a qualitative and quantitative study of motives for marijuana use that is different from most studies in that it used open-ended questions, was interpreted according to a sociological theory of motives dealing with verbal stratagems people use to explain untoward behavior, and used 21 categories for presentation and comparison of quantitative data. Data from several different studies were also analyzed for comparisons.

SUMMARY

To a sociologist, the function of avowed motives is to persuade other people of the appropriateness of an act and to close the gap between actual and expected behavior. Scott and Lyman coined the term "accounts" to represent the verbal devices people use to explain inappropriate actions. Accounts are of two general types: excuses, in which individuals recognize that the

act is a deviation from conventional standards or is inappropriate but do not admit full responsiblity for it, and justifications, in which individuals accept responsibility for their action and object to the pejorative attitude toward it. The authors' investigation of 240 college students used open-ended questions regarding reasons for using or not using cannabis. Results revealed five types of excuses and six types of justifications for marijuana use; for nonuse of marijuana there were four types of excuses and six types of justifications.

Comparisons of quantitative data from these 240 students with data from other studies on initial and continued use showed that marijuana use is justified far more than excused. Knowledgeableness was by far the most important account for the initial use of marijuana. Self-fulfillment was the most frequently cited account for the continued use of cannabis, while appeal to psychological drives was the second most important account. Motives for initial use were quite different from motives for continued use. Comparison of the present study's data with those of studies of occasional and habitual users also showed that marijuana use is justified more often than it is excused. Habitual users more often appealed to psychological drives to account for their use than did occasional users. Habitual users also more often justified their behavior on the basis of self-fulfillment. Occasional users gave a wide variety of accounts and used fewer excuses and justifications than did habitual users. Other studies' data on discontinued use and nonuse of marijuana showed that discontinued use is excused slightly more often it is justified, while nonuse is excused far more often than it is justified. Lack of interest was the only account that was mentioned substantially more often for discontinued use than for nonuse. For those who had never used marijuana, appeals to illegality, psychological harm, physiological harm, drug addiction, and morality were much more common.

CONCLUSIONS

The quantitative data suggested that cessation may be a less permanent behavioral response than abstention. Results also showed that person-oriented meanings are chiefly attached to marijuana behaviors involving considerable experience with the drug. Also, conformity to the expectations of others plays a minor and unequal role in motivating the four types of marijuana behavior: never use, occasional use, habitual use, and discontinued use. Having user friends is conducive to trying cannabis but not to regular use; pressure from family members and peers is offered somewhat more often as a reason for never use than for discontinued use, but the frequencies are comparatively low. In addition, results indicated that persons change or keep their friendships to agree with their own marijuana behavior rather than changing behavior due to friends' pressure. Moreover, regional and demographic characteristics have little bearing on the degree and kind of motives voiced for specific marijuana acts.

Marijuana users seem likely to maintain their pattern of drug use. Thus, antimarijuana programs should be tailored to different types of users and nonusers to increase the probability of success. Efforts to reduce use should try to reduce users' dependence on marijuana for gratification and psychological support and should concentrate more on habitual users than on occasional users. Discontinued users' return to pot could be discouraged by convincing them of the drug's harmfulness and legal hazards or by keeping them involved with nondrug interests. Few resources should be devoted to nonusers, who already hold unfavorable attitudes toward marijuana. Such prevention goals may be hard to achieve, however, due to marijuana's institutionalization within peer groups. Further research is needed to relate motives to changing patterns of drug behavior and should consider drugs other than cannabis.

Abel, E.L. The relationship between cannabis and violence: A review. Psychological Bulletin, 84(2):193-211, 1977.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	135

PURPOSE

One of the most controversial issues in all of psychopharmacology is the nature of the relationship between the use of marijuana and violence. In the course of debate, four different kinds of relationships between marijuana use and violence have been proposed: (1) that marijuana is a major cause of aggression as reflected in violent crimes, (2) that an underlying predisposition toward violence may be precipitated by the drug, (3) that psychopathic or sociopathic individuals are likely to use marijuana and other drugs but without any causal relationship between their behavior and drug use, and (4) that marijuana actually reduces the likelihood of violent behavior. The present study reviews methods used to support the various views, the plausibility of the claims, and factors that must be considered before tentative conclusions can be formulated.

SUMMARY

Cannabis was outlawed in the United States in 1937, partly on the basis of an etymological connection between the words "hashish" and "assassin." In more recent efforts to link marijuana use to violent behavior, lists of crimes supposedly committed by individuals who were in possession of marijuana or under the influence of marijuana at the time of their arrest are cited as

evidence. However, such case lists prove only some marijuana users commit acts of violence, not that marijuana incites individuals to violence. Attempts to determine the incidence of crimes committed by marijuana users have been almost equally unsuccessful, as they do not show whether the arrestee was under the influence of marijuana or was using other drugs. Furthermore, the criminal files used as a data source are based on a biased sample. A number of studies have cataloged types of crimes committed by marijuana users. However, many such studies are methodologically unsound and fail collectively to either prove or disprove the existence of any connection between criminal activity and cannabis use. Even comparing the arrest records of delinquent users and nonusers has not resolved the issue.

In contrast to the methodology of studies that examine marijuana use by individuals coming into contact with the police, a number of sociologists have studied marijuana users in the general population to determine whether they commit more crimes of violence than do nonusers. Studies of this type generally show no significant differences between marijuana users and nonusers in the rate of violent acts or antisocial behavior. Another approach has involved asking experimental subjects to state how they feel while under the influence of marijuana; such studies, however, do not reflect the natural group conditions typical of marijuana use.

Pharmacological factors that are basic to the issue of marijuana's effects on aggression are dosage, immediate and delayed effects, duration of use, polydrug use, and drug adulteration. Each of these factors must be carefully weighed in assessing marijuana's effects. On a neurological level, evidence from animal and human literature indicates that specific neural mechanisms within the temporal lobe and the limbic system are intimately involved in aggressive behavior. Establishment of a link between the neurophysiological effects produced by cannabis and neural activity in a particular area of the brain, such as the temporal lobe, could account for some of the isolated instances in which violence has been associated with marijuana use. Striking similarities between the symptoms associated with temporal lobe epilepsy and marijuana intoxication suggest that such a link may exist.

Studies have shown that although a release of violent impulses (e.g., under the effects of marijuana) could result in violent behavior, the probability of such an occurrence depends as much on the individual as on any particular drug. Thus, marijuana may precipitate violent behavior in individuals who are already unstable. Various studies suggest that frustration, deprivation, imposition of authority, or stress may trigger violent reactions during marijuana intoxication. However, individuals predisposed to using marijuana chronically may or may not be violent by nature.

Users' immediate condition or mind set at the time of drug use is generally considered to affect how they behave in response to the drug. Thus, whether individuals behave violently after using marijuana may depend to a certain extent on whether they believe that marijuana precipitates violence, whether they are prepared for the subjective experience of marijuana intoxication, and whether they are using marijuana to boost their courage. The interaction between the physiological changes produced by the drug and the setting in which the drug is consumed must also be taken into account.

Certain subcultures within a community may inculcate norms, attitudes, and methods of coping with adversity that tend to emphasize or minimize aggressive behavior. Furthermore, chronic use of substances such as marijuana is not a distinct social problem that is independent of other kinds of antisocial behavior; age, race, and sex of subjects must also be considered, as these variables are often associated with different frequencies of drug use and violent behavior.

CONCLUSIONS

The main impression from available evidence is that marijuana is not a major cause of aggression. It should be emphasized, however, that this conclusion is based on the typical marijuana user and tends to underestimate the at-risk individual, who might react violently as the result of preexisting difficulties in impulse control. Subjects with psychiatric problems are rarely included in controlled studies. Under natural conditions, however, such individuals may react violently under the influence of marijuana. The only possibility of documenting such evidence is by the case history method and by examination of criminal records in which both violence and marijuana are mentioned at the time of arrest. The possibility also exists that cannabis increases irritability and aggression when taken under certain social conditions. The important question remains whether violent behavior is a unique consequence of marijuana or whether at-risk individuals

might also be prone to violence under the influence of other drugs. Further studies should be devoted to the effects of cannabis on individuals with particular personality characteristics and on the differential effects between chronic and casual users.

Abruzzi, W. Drug-induced psychosis. The International Journal of the Addictions, 12(1):183-193, 1977.

DRUG	Marijuana; multidrug
SAMPLE SIZE	5,255
SAMPLE TYPE	Users treated for "bad trips"
AGE	Not specified
SEX	Not specified
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Clinical observation
DATA COLLECTION INSTRUMENT	Observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	13

PURPOSE

A "bad trip" may be arbitrarily defined as a drug-induced emotional condition ranging from an acute panic state or severe anxiety episode to a psychotic experience. Longstanding scientific dicta hold that there are great theoretical and practical differences between naturally occurring psychosis and drug-induced psychosis, that chlorpromazine should be used to treat panic states of psychotic episodes, and that drug-induced psychosis is rarely followed by psychotic behavior. This paper describes the author's experience with over 5,000 bad trips treated over a 5-year period. The findings seriously question the commonly held conclusions regarding bad trips.

METHODOLOGY

The bad trips treated included 1,573 in personal practice and work with crisis control centers and 3,682 at youth festivals and concerts, including Woodstock, Powder Ridge, Celebration of Life, and others. Followup studies for 1,107 of these cases were also conducted. Drugs involved included LSD, mescaline, amphetamines, mixtures, THC, barbiturates, STP, PCP, psilocybin, heroin, hashish, and marijuana. A residual emotional effect was defined as one that caused a continuation of intensive psychotherapy or psychiatric hospitalization. Treatments

included either "talking down" the individual or using pharmacological treatment. A total of 598 cases permitted a paired study of the two treatments.

RESULTS

Although Kaplan in 1970 and Grinspoon in 1971 correctly emphasized the relative safety of marijuana, there remains some cause for concern regarding its widespread and indiscriminate use. The current street grass dilution and hashish strength are hazards for some in terms of unexpected potency; users may have a psychotic experience, even a long-lasting one, on grass alone. A total of 73 percent of the author's flashback patients experienced their initial bad trips on other drugs, but their flashbacks were precipitated by alcohol or marijuana. In addition, interviews with 50 to 100 young people a day for years have revealed the sometimes subtle but often devastating effects of amphetamines. There appears to be no reliable way to predict which person is vulnerable, which dosage is dangerous, and how long any given person can safely take amphetamines for medical purposes. Psychosis may remain the lifestyle for some. The psychoses induced by LSD, amphetamines, and other drugs have appeared absolutely undistinguishable from that seen in acute paranoid psychosis; many of these individuals were functioning productively prior to their drug-induced psychoses.

Not all the cases selected could be readily paired. In some cases it seemed undesirable to interject chemical treatment unnecessarily when it was obvious that reassurance and "tender loving care" would be quite adequate. Recognizable disadvantages of using medical treatment included (1) the augmentation by the medical complex of the tremendous fears and insecurities already operative in the bad trip, (2) confirmation of the young person's distorted perception of a long-range psychiatric problem, and (3) the effects of viewers' anticipations on structuring the reactions of the subject exhibiting drug-induced emotional aberrances. For example, treatment staff's avoidance of overreactions seemed to reduce the subject's tendency to act in a bizarre manner or to become violent.

CONCLUSIONS

Serious long-range psychiatric residua after bad trips are more common than often reported and reached 5 to 10 percent of those cases that permitted a long-term followup. Those with a history of emotional disturbances and especially bad trips should avoid intoxicants, including alcohol and marijuana. Amphetamines should be prohibited except for certain, carefully controlled cases. LSD is capable of producing temporary or permanent psychotic postures, flashbacks, seizures, and suicide. When possible, bad trips should be treated with reassurance, psychologically oriented counseling, and compassion; treatment with medicines should be discouraged. Procedures in emergency rooms and psychiatric hospitals should be revised to make them less judgmental, less frightening and coercive, more compassionate, and more attractive and acceptable to young people. Use of a living-room atmosphere with soft furniture and lights, music, and a gentle and reassuring manner is recommended.

Brook, J.S.; Lukoff, I.F.; and Whiteman, M. Correlates of adolescent marijuana use as related to age, sex, and ethnicity. The Yale Journal of Biology and Medicine, 50:383-390, 1977.

DRUG	Marijuana
SAMPLE SIZE	403
SAMPLE TYPE	Adolescents
AGE	13 to 17 years
SEX	Both
ETHNICITY	British West Indian black; American black; white
GEOGRAPHICAL AREA	Brooklyn, New York
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires; interviews
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	23

PURPOSE

Several studies on adolescent marijuana use have focused on its relationship with the demographic variables of ethnicity, sex, and age. Studies on environmental factors related to adolescent drug use have shown that a prominent factor is the effect of interpersonal relations, especially the influence of the adolescent's family and friends. Additional studies have focused on personality/attitudinal correlates of drug use and have shown differences between drug users and nonusers. Few studies, however, have investigated the interactive processes between demographic, personality, and perceived environmental factors.

This study's goal was to explore the relationship between background factors and both perceived environmental variables and a series of personality/attitudinal dimensions and their relationship with drug use.

METHODOLOGY

The study sample consisted of 403 adolescents aged 13 to 17. The sample included 77 male and 61 female British West Indian blacks, 65 male and 76 female American blacks, and 60 male and

64 female whites. Most of the subjects attended inner-city public schools. The adolescents were randomly sampled from contiguous census tracts in Brooklyn, New York. Only adolescents living with their mothers or mother surrogates were included. The National Opinion Research Center's Occupation Scale was used to classify the subjects into 10 occupational groups and 4 educational groups. The center conducted the interviews; questions included were adapted from those used by Jessor and others. Personality/attitude scales focused on the locus of control, assertion/passivity, social desirability, expectations regarding friends and family, and attitude toward deviance. The perceived environmental scales focused on orientation to parents versus peers, closeness to peers, involvement in deviance by relatives, and perception of school achievement.

RESULTS

A total of 19 percent of the adolescents reported ever having used marijuana. Chi-square analyses indicated that sex and ethnicity were not related to adolescent marijuana use. A total of 11 percent of the 13- to 15-year-olds reported marijuana use, while 29 percent of the 16- to 17-year-olds reported marijuana use. Two-way analyses of variance showed that drug users had significantly lower scores in social desirability and reported greater tolerance of deviance. Analysis of the assertion scale indicated that the main effect of drug use was not significant, but a significant interaction effect was found, and it was shown that blacks and British West Indians were more assertive than whites. A drug main effect was not obtained for the family expectation scale, although among West Indians more nonusers than users expected families to satisfy their needs. Users more often reported that they expected their needs of affection, recognition, and dependency to be met by friends than did nonusers. Nonusers consistently perceived greater closeness to parents than to peers. Adolescent marijuana users also reported having more friends and family who used marijuana than did nonusers. They also reported more involvement in deviance on the part of their relatives than did nonusers. Nonusers reported higher grade-point averages, greater time spent on homework, and less frequent cutting of classes than did drug users. Nonusers also attended church services or church-related activities more often than did users. Relationships between most of the scales and adolescent drug use were maintained despite control on the Marlowe-Crowne Scale, the measure of social desirability.

CONCLUSIONS

Both personality and perceived environmental factors were found to be related to adolescents' use of marijuana. Moreover, the patterns of relationships were similar for males and females and for older and younger adolescents. Results suggest that two processes, nonconformity to conventional values and modeling, contribute to adolescent drug-taking behavior regardless of sex, age, or ethnicity. At the personality/attitudinal level, results indicate that conformity to the accepted morals of adult society regarding deviant behavior may serve as a strong force preventing the adolescent from taking drugs. At the institutional level, users were nonconforming in terms of school, the church, and the family. At the family level, closeness and conformity to parental wishes as opposed to those of peers serve to insulate the adolescent from drug use. Thus, marijuana use occurs more frequently among adolescents who do not conform to the social conventions of society at the personality/attitudinal and institutional levels. In addition, modeling of familial and peer drug use may account in large part for adolescent drug behavior. Adolescents who report family drug use often report that they themselves use drugs, suggesting that they are modeling their drug-taking behavior after their parents and siblings.

Burkett, S.R. Religion, parental influence, and adolescent alcohol and marijuana use. Journal of Drug Issues, 7(3):263-273, 1977.

DRUG	Marijuana; alcohol
SAMPLE SIZE	837
SAMPLE TYPE	High school students
AGE	Adolescents
SEX	Both
ETHNICITY	White
GEOGRAPHICAL AREA	Pacific Northwest State
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	8

PURPOSE

Researchers have failed to resolve whether religion is an effective deterrent to juvenile delinquency, although evidence suggests that religious participation inhibits adolescents' use of marijuana and alcohol. Whatever influence the church has on youth, that influence is affected by support given to religious values by significant others outside the church.

By analyzing responses to questionnaires completed by high school students, this study examined the relationship between parents' religiosity and adolescents' acquisition of moral and religious values and alcohol and marijuana use.

METHODOLOGY

Anonymous questionnaires were administered to senior class students in three predominantly white high schools located in one large and two medium-sized cities in a Pacific Northwest State. Minority students were excluded from the study.

The 837 participants and their families were grouped into 3 types according to the religious participation of the parents. There were 300 regular respondents with families in which one or both

parents attended church every week, 282 occasional respondents with at least 1 parent attending church once a month, and 255 respondents with parents who attended church once or twice a year, if at all. The morality, worldly authority, and supernatural sanctions scales developed by Burkett and White were recreated and the results trichotomized into high, medium, and low categories. Alcohol and marijuana use was measured by responses to questions on frequency of use.

RESULTS

Those students who attended church were less likely to smoke marijuana and drink than those who did not attend church or did so infrequently. However, these correlations were not related significantly to subjects' belief in the supernatural, acceptance of world authority, and morality.

Parents' religious participation was strongly related to respondents' religiosity and belief in supernatural sanctions. However, parents' church attendance was only moderately related to respondents' belief that alcohol and marijuana use was sinful and not related to students' acceptance of moral values and worldly authority.

Youths whose parents did not attend church were slightly more likely to express respect for worldly authority than those whose parents attended church regularly. Alcohol and marijuana use was highest among youths who did not attend church but whose parents attended regularly. Half of these youths and 46 percent of those who did not attend church but whose parents attended occasionally indicated that they drank regularly. Comparable figures for marijuana use were 74 percent and 57 percent, respectively. Furthermore, these subjects were most likely to report that their parents did not keep track of their whereabouts when absent from home.

CONCLUSIONS

While religion deters some youths from substance use, parents' religious participation does not appreciably affect this relationship. There is little evidence to suggest that parents influence youths with respect to a morality of personal asceticism, a morality related to both drinking and smoking marijuana. That some youths maintain such beliefs is a function of their religiosity regardless of their parents'.

Alcohol and marijuana use is associated with a pattern of alienation and withdrawal from parental and religious influence. Thus, preventive programs that preach the evils of marijuana and alcohol use may be rejected by those who most need help. The church should examine its role in contemporary society to determine if it wishes to be content with a traditional audience or reach a larger group at the expense of altering its position on specific issues.

Burkett, S.R. School ties, peer influence, and adolescent marijuana use. Pacific Sociological Review, 20(2):181-202, 1977.

DRUG	Marijuana
SAMPLE SIZE	1,114
SAMPLE TYPE	High school senior students
AGE	Adolescents
SEX	Both
ETHNICITY	White
GEOGRAPHICAL AREA	Washington State
METHODOLOGY	Correlational study; multivariate analysis
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Spring 1971
NO. OF REFERENCES	26

PURPOSE

The author describes three dimensions of the youth culture that contribute to the understanding of adolescent behavior: involvement in and attachment to school and commitment to conventional goals; a high degree of involvement in adult-sponsored activities, with youths neither rejecting nor opposing adults as role models; and a general pattern of withdrawal or disengagement from the immediate situation and low commitment to conventional goals. While a 1969 study found that students who had smoked marijuana did not have different plans for college than did those who never smoked, it is possible that these same youths may have withdrawn from the immediate school situation.

This study surveyed senior high school students to test the hypothesis that the more youths withdraw or disengage themselves from the conventional stream of adolescent adjustment, the greater the likelihood that they will become involved in peer rebellion, including marijuana use.

METHODOLOGY

During spring 1971, anonymous questionnaires were administered to all senior students--569 males and 545 females--in three high schools. One was located in an all-white Seattle, Washington,

suburb, while the others were in white neighborhoods in a medium-sized northwest city. Of the students for whom father's occupation could be determined, 40 percent were from white-collar homes and 60 percent from blue-collar homes. Because no differences were found in the extent of marijuana use, the three schools were treated as a single population. Items on the questionnaire measured frequency of marijuana use, school performance, involvement in and attachment to school, and relevance of school to future plans. Students were asked to indicate future occupational plans and whether they planned to attend college.

RESULTS

Marijuana use for males and females alike was related to a general withdrawal from the immediate school situation as characterized by a genuine dislike for school and perceived irrelevance of the educational process. Adolescent feelings of inadequacy were not involved. Plans to attend college and occupational expectations were also unrelated to marijuana use among males and only moderately so among females. These findings are consistent with previous studies that have found marijuana use to be most likely in youths who are ambivalent toward conventional goals and school.

The difference in regular marijuana use among white-collar and blue-collar males who were receiving low grades was slight, although the white-collar males were much more likely to use marijuana than their blue-collar counterparts. Differences in regular use between low-achieving white-collar and blue-collar females were greater, but the number of cases was too small to draw firm conclusions. Additional comparisons showed that females were less subject to whatever strains (i.e., grade pressure) exist than males.

Low-achieving middle class youths were more likely to experiment with and use marijuana regularly than were achieving middle class and lower class youths. Peer involvement was strongly tied to marijuana use both in terms of the amount of time spent with friends and association with others who use marijuana. Other analyses confirmed that those youths who had withdrawn from school were more likely to associate with others who use marijuana and to use it themselves than youths more integrated into the school social system.

CONCLUSIONS

Marijuana use exhibits many of the characteristics frequently associated with juvenile delinquency and other problem behavior. However, the most frequent users of marijuana have neither totally withdrawn from nor negated the legitimacy of the educational process since use is as frequent among youths planning to attend college as among those with no such plans. While marijuana use is one form of rebellious response to failure in school, it is also related to the student's response to the immediate school situation. These findings suggest that the impact of drug educational programs on students who are already turned off by the educational process will be minimal and that the influence of legal controls will be neutralized by peer pressure.

The study does not support the conclusion that marijuana use is antecedent to withdrawal from school or low grades, etc., or that those who have withdrawn are more likely to use marijuana or become involved in a drug subculture. Rather, the findings suggest that those adolescents outside the mainstream of conventionally sanctioned behavior are more likely to engage in those behaviors and maintain attitudes that elicit negative responses from conventional sources.

Carlin, A.S., and Trupin, E.W. The effect of long-term chronic marijuana use on neuropsychological functioning. The International Journal of the Addictions, 12(5):617-624, 1977.

DRUG	Cannabis
SAMPLE SIZE	10
SAMPLE TYPE	Chronic users
AGE	Young adults (mean: 24.1)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Halstead Neuropsychological Test Battery
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	13

PURPOSE

Research on the effects of long-term cannabis use on human brain function has encountered several methodological problems. Some studies have used sample populations with other psychological problems or with patterns of multiple drug use, while others have failed to employ a full array of neuropsychological indicators to assess the brain's organic integrity.

The present project examines brain behavior relationships in a chronic cannabis-using population that denies the use of other drugs and compares this group with individuals who do not use any psychotropic substances.

METHODOLOGY

Subjects selected for the study had to have smoked marjuana at least daily for 2 years with no history of other drug use and no previous neurological illness or injury. The 10 individuals who met these criteria had used cannabis for an average of 5 years, had an average age of 24.1 years, and had an average educational level of 14.6 years. Seven were male and three were female. All were asked to abstain 24 hours prior to testing. A control group matched for age, education, and IQ was drawn from the normative population and examined to rule out histories of psychotropic drug abuse.

Both groups completed the Halstead Neuropsychological Test Battery, which consists of the Wechsler-Bellevue Intelligence Test and other instruments designed to evaluate a subject's ability to organize complex abstract concepts in a meaningful manner and to assess concept formation and problemsolving. Other measures identify visual motor functions, sensory perceptual functions, pure motor functions, immediate alertness tasks, and receptive and expressive language abilities.

RESULTS

Only one difference between the marijuana-smoking subjects and the normative sample reached significance. This was on the Trail Making Test, which identifies cerebral impairment by tapping a person's ability to scan a page with numbers and letters, connecting them sequentially, alternating from numbers to letters. The marijuana-smoking group performed significantly faster than the control group. Evaluations of the profile of scores showed that 1 of the 10 cannabis users manifested clear indications of lateralized cerebral impairment. The remaining individuals in both groups generated profiles that fell well within normal limits.

CONCLUSIONS

The neuropsychological profile of the one cannabis user exhibiting impairment was suggestive of a focal cerebral insult to his right hemisphere rather than the effects of drug intake, which have been shown to have bilateral effects. However, this finding raises the question of possible differential effects of cannabis use on vulnerable individuals. The results indicate that long-term chronic marijuana use does not damage a person's ability to solve complex cognitive tasks, manipulate complex visual motor problems, answer questions dependent on prior learning, and accurately identify sensory stimulations. The study should be replicated with a broader range of subjects varying in age and intelligence to investigate differential vulnerabilities to the impact of cannabis.

Darley, C.F.; Tinklenberg, J.R.; Roth, W.T.; Vernon, S.; and Kopell, B.S. Marijuana effects on long-term memory assessment and retrieval. Psychopharmacology, 52:239-241, 1977.

DRUG	Marijuana
SAMPLE SIZE	16
SAMPLE TYPE	Infrequent users
AGE	Young adults; mature adults (range: 18-35)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Descriptive study
DATA COLLECTION INSTRUMENT	Common facts recall and recognition tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	7

PURPOSE

Recent experiments have shown that information presented immediately before intoxication with marijuana is equally well retrieved by subjects who have received marijuana and those who have received placebos. However, the effects of marijuana on the retrieval of information not presented under experimental conditions have not yet been investigated.

This study tested the claim that marijuana promoted access to memories of prior events consciously remembered for years by examining intoxicated subjects' ability to recall from long-term memory a series of common facts.

METHODOLOGY

The subjects were 16 college-educated males aged 18 to 35 who had used marijuana twice a week or less. They were asked to avoid using any drugs starting 1 week before the experiment and throughout the 2-day experiment. Each subject was tested individually each day of the experiment.

The study instrument was a common facts recall test that contained 100 questions on the humanities, sciences, and current events and covered information to which most college-educated persons have been exposed.

As the start of each test day, each subject ate a standard breakfast of granola and skim milk. After 30 minutes, double-blind conditions were used to adminster to eight of the subjects cookies containing 0.3 mg/kg THC and to the other eight subjects cookies containing marijuana from which all cannabinoids had been removed. The drug conditions were reversed on the second day of the experiment.

The subjects completed the facts recall test beginning 45 minutes after drug ingestion. Fifty of the questions were administered each day. Subjects were asked to answer each question whether or not they knew the answer and to circle it if they were certain they were correct. If they were uncertain, they were to indicate whether they would or would not be able to recognize the correct answer on a recognition test showing alternative answers. Two hours and fifteen minutes after ingestion of the cookies, subjects took the common facts recognition test, which contained the same questions as the recall test but which listed four alternative answers to each question. On both testing days all subjects performed other perceptual, cognitive, and clinical tasks.

RESULTS

Marijuana had no effect on recall or recognition performance. In addition, during both marijuana and placebo conditions, subjects could accurately predict their recognition memory performance. Using a scale on which 0 was the nondrug state and 100 was the "highest" they had ever been, the subjects reported a mean high on marijuana of 28 at the end of the recall task and 60 at the end of the recognition task.

CONCLUSIONS

Marijuana did not affect subjects' ability to retrieve nonexperimentally presented information from long-term memory. However, the findings call into question the assertion that marijuana provides access to facts and events that are inaccessible when the subject is not intoxicated, although the task used in the study did not permit conclusions about the recall of personal experiences.

For both marijuana and placebo conditions, subjects were able to assess accurately the information residing in their memory, even though they lacked complete access to the information. Moreover, results indicated that subjects' predictions of their own future memory task performance may be as accurate during marijuana intoxication as during the unintoxicated state.

A possible explanation for these results is that the marijuana dose was too small. However, the significant drug effects apparent from another cognitive task administered during the experiment indicated that the dose was sufficient.

Freemon, F.R., and Al-Marashi, M.S.H. Long-term changes in the sleep of normal volunteers administered multiple doses of delta-9-tetrahydrocannabinol. Drug and Alcohol Dependence, 2:39-43, 1977.

DRUG	THC
SAMPLE SIZE	2
SAMPLE TYPE	Healthy, infrequent marijuana users
AGE	Young adults
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Case study
DATA COLLECTION INSTRUMENT	Electroencephalogram; observations; questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	7

PURPOSE

Controlled polygraphic studies and interviews with street users of marijuana have revealed that abstinence following chronic marijuana use produces sleep disturbances. This study followed 30 nights of sleep by two volunteers to determine the changes in polygraphic sleep patterns during and after the use of THC, the major psychoactive component of marijuana.

METHODOLOGY

The two volunteers were men in their early twenties who were known personally by members of the research laboratory staff. The volunteers reported marijuana use about once monthly. They were told about the project but did not know which nights or how many nights they would receive a placebo or the active agent. They avoided napping and use of licit and illicit drugs during the study.

On the first 6 nights of the 30-night experiment, placebo capsules were given. On nights 7 to 18, capsules containing 20 mg of THC were given. On nights 19 to 30, placebo capsules were again given. The men slept in the laboratory, with electroencephalogram (EEG) and other sleep

variables recorded by the method originated by Dement and Kleitman and standardized by Rechtschaffen and Kales. They completed questionnaires each night and morning that recorded mood changes.

The statistical analysis focused on five groups of five nights each: the baseline period (nights 2 through 6), the first five and last five nights of drug administration, and the first five and last five nights of placebo administration. Separate t-tests compared the following sleep parameters: sleep latency (the time awake from lights out to the first sleep spindle in the EEG), wake time (time awake from first sleep spindle to morning awakening), total sleep time, percentage ot total sleep time occupied by each polygraphically defined sleep stage, the amount of rapid eye movement (REM) sleep in the first 3 hours of sleep, and the number of eye movements per minute of REM sleep.

RESULTS

The subjects could not differentiate placebo nights from THC nights. They also experienced no mood changes during the course of the study.

The subjects experienced greater sleep latency and wake times during the postdrug period than during the baseline period. The percentage of sleep spent in the REM stage did not change significantly. The time spent in slow wave sleep (non-REM stages 3 and 4) decreased during the postdrug period.

Sleep latency rose from an average of 17.9 minutes on baseline nights to 39.7 minutes during the first five withdrawal nights. Wake time rose from 3.8 minutes during the baseline period to 8.5 minutes during the first five withdrawal nights. These values were also higher on the last five nights of the study than during the baseline period. Slow wave sleep dropped from 60.7 minutes per night during the baseline period to 37.7 minutes during the first five postdrug nights and 28.5 minutes during the second five withdrawal nights. The total sleep time and the amount of time in non-REM stage 1 were the same in the five periods.

CONCLUSIONS

The mild difficulty in falling and staying asleep during abstinence following chronic THC administration may contribute to an unconscious tendency to continue drug use. It is worrisome that disruption produced by 12 days of THC use persisted beyond the 12 postdrug days examined in the study. Future research should continue recording postdrug sleep effects until sleep returns to baseline levels.

Fried, P.A. Behavioral and electroencephalographic correlates of the chronic use of marijuana--a review. Behavioral Biology, 21:163-196, 1977.

DRUG	Cannabis
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Animals, humans
AGE	Not applicable
SEX	Not specified
ETHNICITY	Cross-cultural
GEOGRAPHICAL AREA	Cross-sectional
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	204

PURPOSE

A 1974 review of research concerned with the behavioral effects of cannabis in animals deliberately omitted the literature on the repeated use of marijuana and on the related topic of tolerance. This paper reviews and integrates data related to chronic marijuana use. Chronic tolerance is defined as a situation in which, following many administrations of a drug, an increased dose is needed to produce the same effects as the original dose, or the same dose produces a reduced effect.

SUMMARY

Spontaneous motor activity and reactivity. Marijuana constituents decrease spontaneous motor activity in a large number of animal species. The dose-dependent effects decrease with chronic administration. As tolerance develops, excitatory behavior becomes evident. Little, if any, tolerance develops to this aspect of the drug's effect.

The effects of chronic marijuana use on human motor activity and reactivity is difficult to assess because of the major effects of psychosocial factors, such as socially acquired cues and expectancies regarding drug effects. Even at high doses, psychosocial factors play an important role.

The amotivational syndrome, which has often been described as an effect of chronic marijuana use, cannot necessarily be ascribed solely to marijuana because of the complexity of the interaction of drug use and the user's general lifestyle and the crucial importance of socialization experiences preceding marijuana use.

Research on humans suggests that if objective measurements are taken and psychological variables are controlled, the motor impairments, evident after the drug is first taken, decline after heavy repeated use of the drug. The clinical literature also indicates that psychological disorders arising directly from chronic marijuana use are relatively rare in North America but that the drug contributes to and makes worse previous chronic mental disorders in specific persons.

Learned behavior. In animal studies, the chronic administration of cannabis components in experiments involving positively reinforced, schedule-controlled tasks has resulted in the reestablishment to predrug levels of the reinforcement rate but not necessarily of the response patterns. In some circumstances, tolerance appears to involve a learning process.

Human studies in this area have generally been laboratory experiments using experienced users, most of whom had used marijuana once a week or less. These experiments reveal an impairment in relatively complex tasks that waxes and wanes and is susceptible to attentional and motivational factors. The impairment of light users and lack of impairment among heavy users suggest the presence of tolerance in the latter group. Surveys in other cultures have also frequently demonstrated no effects or minimal effects, indicating the presence of tolerance.

Electrophysiological studies. The cortical electroencephalographic (EEG) changes resulted from acute administration of cannabinoids are qualitatively similar across many species. The reports usually cite a generalized reduction in cortical EEG voltage.

At the subcortical level, gross slow wave changes have been observed in a number of sites. Human studies have typically reported an increase in alpha activity, a slight decrease in the peak frequency of alpha rhythm, and an increase in beta activity following an initial dose of cannabis in the test situation.

Data on the effects of chronic administration of cannabinoids are scanty. Studies in rats have agreed with the behavioral data indicating that the depressant and stimulant effect of cannabis constituents are differentially affected by chronic administrations. Human experiments in which cannabis was administered daily have produced minimal EEG changes. The available human data indicate that tolerance develops differentially to the excitatory and sedative properties of THC.

General considerations. Data are lacking on the duration of tolerance. The mechanisms underlying the attenuation of the effect of cannabis are also not understood. Occasional reports have been received of acute abstinence symptoms following heavy, chronic use of marijuana. Some researchers have also reported that repeated marijuana use interacts with the immunosuppressant system. Conflicting data also exist regarding plasma testosterone levels in chronic marijuana smokers.

CONCLUSIONS

Many of the acute effects of cannabis or its constituents are changed if the drug is administered repeatedly. The chronic use of cannabis influences the depressant and excitatory effects of marijuana differentially. Tolerance develops to the behavioral and EEG-depressant effects of cannabis drugs, but there is no attenuation, and perhaps even a potentiation, of the stimulant effects. Learning factors have a substantial influence on the rate of development of tolerance. Among these factors is the opportunity or necessity to make behavioral responses that counteract the reductions in performance resulting from the drug's effects. The animal and human literature are in general agreement if socially acquired cues and expectancies and parameters involving dosages and frequencies are taken into account.

Huba, G.J.; Segal, B.; and Singer, J.L. Organization of needs in male and female drug and alcohol users. Journal of Consulting and Clinical Psychology, 45(1):34-44, 1977.

DRUG	Marijuana; alcohol; other unspecified drugs
SAMPLE SIZE	1,095
SAMPLE TYPE	College students
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Kentucky; Connecticut
METHODOLOGY	Comparative study; multivariate analysis
DATA COLLECTION INSTRUMENT	Jackson's Personality Research Form; questionnaire
DATE(S) CONDUCTED	Fall 1973 and 1974
NO. OF REFERENCES	29

PURPOSE

Recent investigations have demonstrated consistent quantitative differences between users of drugs and alcohol and nonusers, relating to an external personality dimension, a susceptibility to social pressures, and a corresponding need for stimulation. However, there have been no empirical attempts to show that personality organization is qualitatively the same in users of drugs and alcohol as in nonusers or to examine differences between the sexes in this respect.

This study investigates the personality domain using a subset of the basic needs postulated by Murray. It questions whether Murray's needs, as measured by Jackson's Personality Research Form (PRF), have a stable organization across individuals differing in patterns of substance use (including marijuana and alcohol) and sex.

METHODOLOGY

In the fall of 1973 and 1974, 1,095 college students (498 males, 597 females) completed the PRF as part of a larger study on drug and alcohol use. Two different versions of the PRF were administered in 1973 and 1974, a short form in 1973 and a long form in 1974. For this analysis, only the 15 scales given to all subjects were used. They were: the needs for achievement,

affiliation, aggression, autonomy, dominance, endurance, exhibitionism, harm avoidance, impulsivity, nurturance, order, play, social recognition, understanding, and the scale for infrequent responding. Subjects also completed a questionnaire about drug and alcohol use at the PRF testing session.

The students were divided into groups of nonusers of drugs and alcohol, users of alcohol only, users of marijuana only, and users of a variety of drugs in addition to marijuana. The PRF was factored for each of the groups, with six factors extracted in each analysis. Subgroup factor-pattern matrices were aligned to a common position, and the stability of the factorial solution across groups was assessed. The sample was also divided into four groups based on the year of testing and student's sex. A six-factor solution was calculated for each group, and the factor stability across analyses was examined.

RESULTS

All factors in the PRF analysis were found to be relatively stable. The factor pattern matrices for male and female samples were quite similar. Moreover, the pattern of correlations among the primary factors found in each analysis was stable across subgroups. A Monte Carlo procedure suggested by Huba demonstrates the validity of these Procrustean rotations, proving that the total group factor matrix provides a better target for the study's factor matrices than some randomly generated target factor matrix.

CONCLUSIONS

The experiment demonstrates a large amount of factorial stability for the Murray needs measured by the short form of the PRF. It is interesting to note that four of the factors were more stable than the remaining two. In particular, the generalized achievement motivation and playfulness dimensions appear qualitatively different for individuals who do not use drugs or alcohol. For example, nonusers express their achievement needs through socially desirable activities and express playfulness in behavior that is brash but simultaneously concerned with following the rules. Drug users, however, are not so likely to express these needs through socially desirable activities.

The general instability across factors found by Stricker and by Nesselroade and Baltes can be attributed in part to differences in subjects and methods. While the results of this research are not generalizable to older adults or chronic substance abusers, they do prove that moderate and short-term use of a variety of drugs and alcohol is not associated with the reorganization of motivational patterns in a large and heterogeneous sample of college students.

Kv'alseth, T.O. Effects of marijuana on human reaction time and motor control. Perceptual and Motor Skills, 45(3, Pt. 1):935-939, 1977.

DRUG	Marijuana
SAMPLE SIZE	6
SAMPLE TYPE	Students
AGE	21 to 24 years
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	7

PURPOSE

The nature of marijuana's effects on human physiology and psychology is still a subject of considerable controversy. The evidence seems to indicate, however, that moderate doses of marijuana have minimal acute effects and that findings of significant detrimental effects are related to higher doses, task complexity, and degree of experience with the drug. Studies on complex reaction time and motor control have produced conflicting findings. In addition, such studies have typically used pursuit meters and rotors, but no studies have involved motor control of accurate arm movements aimed at a target.

This study focused on marijuana's possible effects on reaction time and motor control. It analyzed interactions between drug conditions and task complexity for both reaction time and movement time for accurate motor responses, as well as the main effects of marijuana on reaction and movement time and on the rate of movement errors.

METHODOLOGY

Three experimental tasks were used. The first was a classical discrete choice experiment for which the subject was required to respond as quickly as possible to each visual stimulus by pressing the appropriate button. In the second experiment, subjects tapped a light stylus back and forth between two parallel metal plates as fast as possible while trying to limit the misses to 5 to 10 percent. The third experiment was similar to the first, except that rotary arm movements were used. For each experiment, the subject sat at a table on which the apparatus was placed.

Subjects were six male undergraduate students, aged 21 to 24, who participated as unpaid volunteers. All were experienced marijuana users, and half had tried harder drugs. Five performed the first experiment and three performed the other two experiments. Three drug conditions with varying dose levels of marijuana were used. Subjects first performed the experiments without drug inhalation. The second experiment used a low dose level of 6.5 mg THC and the third from 19.5 to 26 mg THC, or enough to reach a maximum "high."

RESULTS

Results showed that simple and complex reaction time was not significantly affected by marijuana or by the interaction between drug conditions and the amount of information transmitted during the task. Linear movement time was significantly reduced after smoking marijuana, while rotary movement time was not significantly affected. The interaction between drug conditions and task complexity was insignificant for both linear and rotary movements. Error rates for the two types of motor movements increased significantly, especially for linear movements, as the dose level increased. When asked by the experimenter after completing the three experiments, half of the subjects believed that marijuana did not affect their performance, while the other half felt that their performance did suffer some impairment. Significant individual differences existed between subjects for linear movements but not for rotary movements.

CONCLUSIONS

Results showed that certain areas of performance were affected by increasing doses of marijuana and that subjects differed in their perceptions of marijuana's effects on their performance.

Maccannell, K.; Milstein, S.L.; Karr, G.; and Clark, S. Marijuana-produced impairments in form perception. Experienced and non-experienced subjects. Progress in Neuro-Psychopharmacology, 1(3/4):339-343, 1977.

DRUG	Marijuana
SAMPLE SIZE	32
SAMPLE TYPE	Experienced users and nonusers
AGE	Not specified
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Descriptive study
DATA COLLECTION INSTRUMENT	Form perception tests; Primary Affect Scale; observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	8

PURPOSE

This study is part of a series of 10 experiments designed to test the effects of marijuana and a placebo on the performance of experienced and nonexperienced cannabis users. Previous experiments showed that marijuana produces an increase in pain tolerance and impairs coordination. This study examined the effect of marijuana on tactual form perception ability.

METHODOLOGY

From a pool of 1,500 volunteers, researchers selected 16 experienced cannabis users and 16 nonusers matched as closely as possible on age and education. Each group contained eight males and eight females. Subjects in the experienced group had used marijuana from 21 to 35 times during the past year. Participants were instructed to abstain from alcohol for 24 hours and all other drugs for 7 days prior to the experiment. A 600 mg dose of 1.3 percent THC and a placebo were administered double blind to the subjects during two visits a week apart. A special smoking device was developed to control the amounts of THC and placebo and to measure accurately the amount of THC absorbed by the subjects.

Form perception ability was measured with a tactual form board containing a series of 10 blocks of different shapes. Participants were blindfolded and asked to place the blocks in the correct spaces on the board. The time required to place all blocks correctly was recorded, but each test session was limited to 25 minutes. One trial was conducted with the dominant hand and one with the nondominant hand. Different but equivalent boards were used at each session and for each trial. Subjects were allowed two practice sessions 6 hours and 3 hours prior to the actual experiment. The pretest was given 30 to 60 minutes before smoking marijuana or the placebo, and the posttest was given beginning 15 minutes after smoking. Intoxication was measured by the judgment of the drug administrator, by the Primary Affect Scale (measuring subjects' emotions), and according to whether subjects accurately identified the substance they had received after completing each test session.

RESULTS

Analysis of the data on form perception with the nonpreferred hand revealed that marijuana significantly decreased performance compared to placebo. Although no major changes in performance were observed for the preferred hand, a trend toward impairment under marijuana was observed. Further examination of the data showed a trend toward greater impairment on both hands for the experienced than for the nonexperienced subjects. Intoxication tests demonstrated that marijuana produced an increase in happiness in both experienced and nonexperienced participants. The ability to make a correct posteriori identification of the drug condition appeared related to previous cannabis experience.

CONCLUSIONS

A moderate dose of marijuana can produce an acute impairment in form perception for both experienced and nonexperienced users. However, differences in marijuana's effect between preferred and nonpreferred hands may be related to skill development and dexterity. The results also support other studies in the conclusion that marijuana produces similar but more pronounced effects in experienced users than in nonusers, the magnitude of which depends on the behavior under study.

Mercer, G.W., and Kohn, P.M. Values associated with marijuana use among college students. British Journal of Addiction, 72:151-158, 1977.

DRUG	Marijuana
SAMPLE SIZE	123
SAMPLE TYPE	University students
AGE	Not specified
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Downsview, Ontario, Canada
METHODOLOGY	Multivariate analysis
DATA COLLECTION INSTRUMENT	Questionnaires; Rokeach Value Survey
DATE(S) CONDUCTED	Spring 1973
NO. OF REFERENCES	41

PURPOSE

An examination of the literature permits inferences regarding the values held by marijuana users and nonusers. Instrumental values--conceptions of desirable character traits--that users might be expected to hold include broadmindedness, imagination, independence, and liberal socio-political and sexual attitudes. Obedience would be expected to be low in their value hierarchy. Terminal values--desirable end-states of existence--that might be expected of users include freedom and an exciting life, while family security should be of low value.

This study used Rokeach's Value Survey to determine the values associated with marijuana use among students at a Canadian university. It was expected that self-reported marijuana use would be related to some of the values previously found to be characteristic of hippies, persons with permissive attitudes about illegal drug taking, and college students who regularly use LSD and heroin. The analyses were based on the extent of marijuana use and were grouped by sex because of the evidence that male and female drug users may emphasize different values.

METHODOLOGY

Anonymous questionnaires containing demographic items, the value survey, and items on past and present marijuana use were sent to 275 randomly selected undergraduates at York University in Downsview, Ontario, in the spring of 1973. A total of 54 males and 69 females returned usable questionnaires.

Past marijuana use was categorized as none, light use (1 to 50 times), and heavy use (51 times or more). The three groups constituted about 28, 36, and 36 percent of the sample, respectively. Current use was defined as nonuse, light use (twice a month or less), and heavy use (weekly or more often). These groups constituted 45.9, 24.1, and 30 percent of the sample, respectively. T-tests were used to compare the value rankings of those who had never used marijuana, those who had stopped using the drug, and those who continued to use it. The entire sample was similar to the university population in terms of gender and year of university study.

RESULTS

Heavy users valued broadmindedness and imagination more than nonusers and light users. Heavy users also valued obedience less than did the other groups. Nonusers ranked family security higher than did light users and heavy users, while heavy users considered freedom more important than did nonusers.

The observed sex differences seemed to partly reflect conventional sex-role identification. Women placed more importance than men on being cheerful and honest (interpersonal values), and on having inner harmony, whereas men valued more highly than women the qualities of being ambitious, capable, and logical (qualities associated with achievement). Women placed greater importance on equality than men.

There were only two significant sex-linked discriminators. Among nonusers, women valued true friendship more than men; light and heavy users did not show this sex difference. Among women subjects, heavy marijuana users ranked being forgiving as less important than did nonusers. The men did not show comparable differences. These suggest a kind of marijuana-unisex effect, with women hardening and men mellowing with use.

No statistically significant differences were found between the value hierarchies of those who had never used marijuana and those who had stopped using it. When the level of use was controlled for, no differences were found between the value hierarchies of those who stopped using marijuana and those who continued to use it.

CONCLUSIONS

A simple dichotomy does not exist between users and nonusers. Value changes may be associated more with the prolonged use of marijuana than with occasional experimentation. The values of users and nonusers in college differ less than those of hippies and nonhippies, probably because marijuana use does not represent a sharp break with conventional standards. However, important value differences exist between the groups studied.

Marijuana use is not immoral or amoral but, instead, reflects a set of values and a morality that differ from those held by adamant nonusers. Those who seek to prevent the use of illicit drugs through the provision of positive alternatives should ensure that those alternatives emphasize values like freedom, broadmindedness, and imaginativeness. This study was a small, exploratory one. Further research should use a larger sample and a Likert-type scale to assess values. Longitudinal studies would also be useful to determine any causal relationships between drug use and values.

Paton, S.; Kessler, R.; and Kandel, D. Depressive mood and adolescent illicit drug use: A longitudinal analysis. The Journal of Genetic Psychology, 131:267-289, 1977.

DRUG	Marijuana; multidrug
SAMPLE SIZE	8,206
SAMPLE TYPE	High school students
AGE	Adolescents
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	New York State
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Fall 1971; spring 1972
NO. OF REFERENCES	50

PURPOSE

Studies on the role of psychological factors in illicit drug use have produced inconclusive results. Studies of normal populations of college or high school students have generally found increased depression scores among heavy users of marijuana or other illicit drugs but not among moderate users of marijuana, alcohol, or tobacco. However, all these studies have examined subjects at only one point in time. Haagen's unpublished longitudinal study of drug use among college students showed differences among frequent users, infrequent users, and nonusers. These results raise questions about both the nature and the direction of the relationship between psychological factors and drug use. In the present paper, findings of a longitudinal study of high school students followed over 1 year are presented. The study's goal was to clarify the relationship between depressive mood and illicit drug use. The study examined the relationship of depressive mood to use of drugs, the possibility that use of drugs results in depressive moods and vice versa, and the similarities and differences in processes involved in the use of marijuana and of other illicit drugs.

METHODOLOGY

A probability sample was drawn from 18 public high schools throughout New York State, using a 2-stage procedure involving the selection of a stratified sample of high schools and a sample of students clustered by homeroom and stratified to represent the different grades within each school. Students were surveyed in the fall of 1971 and the spring of 1972. A total of 8,206 students were initially sampled. Using code numbers, 66 percent of the first group of students could be matched to themselves at the second survey, to produce a panel sample of 5,468 subjects. Anonymous questionnaires were used to ask the subjects about their drug use and about depressive moods, normlessness, feelings of aloneness, and self-esteem. Questions on current drug use referred to use within the 30 days preceding each survey. Goodman's log linear method was used to analyze the data.

RESULTS

In the total sample surveyed in fall 1971, depressive mood was positively associated with involvement in illicit drug use, especially drugs other than marijuana. Differing interactive relationships were found over time depending upon the drugs involved. Depressive mood was positively related to the onset of marijuana use among nonusers and negatively to the continuation of marijuana use among users. Depressive mood also predicted the use of other illicit drugs by marijuana users. While the beginning use of illicit drugs other than marijuana was positively associated with increased depressive mood, continued multiple-drug use was related to reduced depressive mood.

CONCLUSIONS

A relationship was found between depressive mood and illicit drug use that varied depending on whether the drug in question was marijuana or another illicit drug. Findings suggest that certain depressed adolescents may begin to use marijuana as a way of relieving their depression. When marijuana use fails as a coping mechanism, they turn to other illict drugs with stronger effects. Their use of the other drugs presumably continues because these other drugs have helped relieve their depressed mood.

Further, the users of illicit drugs other than marijuana are more likely to be experimental users; marijuana users are more stable in their use than are users of other illicit drugs. Depressive mood specifies patterns of change in drug use over time; drug use did not seem to lead to an increase in depressive mood. Findings cannot support the conclusion that depressive mood causes an adolescent to use drugs; depressive mood is only one possible reason an adolescent might use drugs. In addition, the use of drugs to relieve a depressed state may be considered appropriate by some social groups but not by others. The relationships between depressive mood and illicit drug use were independent of the overall levels of depressive mood within various groups. These results indicated complex relationships between reasons for use, social context, and patterns of use.

Pomazal, R.J., and Brown, J.D. Understanding drug use motivation: A new look at a current problem. Journal of Health and Social Behavior, 18:212-222, 1977.

DRUG	Marijuana
SAMPLE SIZE	101
SAMPLE TYPE	College students
AGE	Young adults (median age: 21.5 years)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Midwestern United States
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	20

PURPOSE

Although much research has focused on the resaons for drug use, little comprehensive and systematic research linked to a theory of drug use has been conducted. A recent revision of the social-psychological theory of behavior developed by Fishbein and others offers a potential model for explaining drug use patterns. This theory asserts that a person's intention to engage in a behavior is determined by three main factors: (1) personal attitude toward the act, (2) perceived social norms regarding the behavior, and (3) personal morals regarding the behavior. The present study was designed to test the hypothesis that the model's components are the necessary and sufficient determinants of drug use motivation and thus can account for factors that may influence a person's decision to use a drug. For this hypothesis to be valid, the model must systematically mediate the effects of any and all variables related to intentions to use drugs. Smoking marijuana was the drug use behavior chosen to test the adequacy of the proposed theory.

METHODOLOGY

A preliminary sample of 40 college students completed an open-ended questionnaire, which was used to select the beliefs and opinions to be included in the final questionnaire. Measures on

the final, closed-format questionnaire were based on the semantic differential technique and assessed the behavioral intention to smoke marijuana, personal attitude toward smoking marijuana, perceived social pressure concerning smoking marijuana, and the influence of moral considerations on smoking marijuana. Questionnaire items also assessed the extent to which the subject believed each of 18 perceived consequences of smoking marijuana, the subject's evaluation of each outcome, expectations of what important others think, and motivation to comply with others' norms. Other items concerned availability of the drug, present use, sex, age, birth order, religion, religiosity, political orientation, and relationship to parents.

Subjects were 101 male and female college students at a midwestern university. Respondents had a median age of 21½ years, were 51 percent male, 50 percent Protestant, 28 percent Catholic, 16 percent Jewish, and 62 percent users of marijuana. The 101 responses came from a total of 151 potential subjects approached by the experimenters at various campus locations. Multiple regression analysis was used to examine the data.

RESULTS

Results indicated that the model was highly accurate in predicting intentions to smoke marijuana. For the present sample, intentions to smoke marijuana were influenced mostly by attitudinal and moral considerations. Persons from the college sample who were motivated to smoke marijuana had a favorable attitude toward smoking and did not consider it immoral. They appeared to make this decision independently of the expectations of important others. Data indicated that the model's three components are necessary and perhaps sufficient determinants of motivations to use drugs. In addition, a high correlation between intentions to smoke marijuana and reported use was found. Reported availability was unrelated to the intention to smoke, but availability was significantly correlated with the reported use of marijuana, indicating that factors influencing use of a drug may not be those that influence a person's underlying motivation. Although the social norm measure was not related to intentions to smoke marijuana, it was still predictable from measures of its proposed determinants. The attitudinal component of the model showed the largest influence on the prediction of intentions. Those who intended to smoke marijuana differed from those who did not intend to smoke marijuana on many specific beliefs about the positive and the negative consequences of smoking marijuana. Those who intended to smoke marijuana believed more strongly that smoking would make them feel relaxed, hungry, tired, sociable, euphoric, and sexually aroused. Intenders believed it would enhance their senses and would be less harmful than using alcohol. Results also indicated that a majority of the college sample were motivated to smoking marijuana for positive, social reasons.

CONCLUSIONS

Results indicated that drug use motivation can be predicted and explained systematically from the proposed social-psychological theory of behavioral intentions. Results suggested several possible reasons why many traditional approaches to drug education and counseling have failed to change attitudes or reduce drug use substantially. These approaches may have focused on irrelevant beliefs, may have failed to focus on enough different relevant beliefs, may not have been directed at the main motivation for using drugs, and may have focused on the drug itself rather than on the use of the drug. Educators and counselors must identify the personal motives behind the use of a drug before they can begin to offer attractive alternatives. The techniques used in this study could be used to design rehabilitation or counseling efforts. For example, relevant beliefs of the target population should be considered in planning lecture content. Counselors can use appropriate value clarification procedures to enable clients to understand the beliefs that contribute to their individual attitudes toward a drug. Although these approaches may not be easy or even effective, they can identify and deal directly with the factors forming the motivation to use drugs and stand more chance of success than hit-or-miss approaches.

Sadava, S.W., and Forsyth, R. Person-environment interaction and college student drug use: A multivariate longitudinal study. Genetic Psychology Monographs, 96:211-245, 1977.

DRUG	Marijuana
SAMPLE SIZE	374
SAMPLE TYPE	College students
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Ontario, Canada
METHODOLOGY	Survey--correlational and longitudinal
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	55

PURPOSE

Serious problems in research design and conceptualization have severely limited the useful results of the research literature on nonmedical drug use. Much research has yielded isolated, univariate empirical statements, whereas the finding that significant sociocultural and personality variables are related to drug use indicates that a multivariate theoretical structure using a social-psychological approach is needed. The interaction of the person and the environment should be a central concept. The study applies Jessor's extension of the social learning theory framework, developed to deal with patterns of problem behavior, to the specific problem of patterns of drug use. The framework views the person and the environment as supplementary predictive systems and categorizes variables as proximal or distal. Proximal environmental variables related to drug use include models and reinforcement for drug use from both peers and family, an absence of sanctions against use, and availiability of drugs. Proximal personal variables are individuals' perceptions that the use of or abstinence from drugs is functional. Distal environmental variables are higher age and year in college and lower grade-point average, while distal personal values are high values for independence, peer conformity, and risk; high social alienation, tolerance of deviance, and drug use; low delay of gratification, time perspective, and expectancies for interpersonal trust.

METHODOLOGY

Subjects were 374 male and female undergraduate students at a small university in Ontario, Canada. A questionnaire was administered to the subjects in small groups both at the start of the academic year and about 6 months later. Separate scales were developed for each of the four groups of variables. Measures for drug-using behavior included frequency of cannabis use as self-reported over a previous 6-month period, time as a user, range of polydrug use, and adverse consequences of use. Linear stepwise multiple regression, canonical, and multivariate interaction analyses were performed.

RESULTS

Initial analysis indicated that patterns of isolation and reduced self and social controls were associated with higher frequency of drug use; personal dispositions and an environment supportive of drug use were related to polydrug experimentation; a supportive environment but a personal disillusionment with drugs were a function of time as a user; and conflict was found with respect to adverse consequences of use. Canonical analyses showed that moderate use was indicated by length of time as a user and the range of polydrug use. Social psychological variables associated with moderate use included high social support predictor and change scores, high tolerance for drug use, lower negative fear functions, and older age. The drug abuse pattern appeared to be unrelated to frequency of use but included broad experimentaion with various other drugs. The abuse pattern was also related to social support and tolerance of drug use, higher risk values, lower delay of gratification, higher tolerance of deviance, and reduced social controls. Further analyses indicated that some variables had both a main effect and an interaction effect in combination with another variable. For example, social support acted by itself and in combination with both negative fear functions and positive coping functions.

CONCLUSIONS

Despite the methodological limitations, results clearly indicated that social psychological measures did predict drug-use patterns at rather encouraging levels. The design does not conclusively establish causal inference beyond covariation but does indicate the causal influence of sets of social and personal variables. Data also showed that real changes in scores over time covaried with patterns of drug use. A major finding was that asking what social psychological factors predict drug use depends on the conceptual and operational specification of that complex phenomenon. A more precise, specific, and multidimensional set of conceptions of operations is needed in dealing with criteria of drug use. Results also showed that both person and environment contributed independently and significantly to account for substantial variance in drug-using behavior. Proximal and distal variables also made independent contributions. Results also indicated that a multivariate, multidimensional systems model is necessary to account for drug use patterns. Results are generally consistent with the authors' earlier reports and with the work of the Jessor group. Further research is needed to explore causal patterns, the concept of environmental traits, and self-regulatory systems.

Salzman, C.; Kochansky, G.E.; van der Kolk, B.A.; and Shader, R.I. The effect of marijuana on small group process. American Journal of Drug and Alcohol Abuse, 4(2):251-255, 1977.

DRUG	Marijuana
SAMPLE SIZE	54
SAMPLE TYPE	30 users versus 24 nonusers
AGE	Not specified
SEX	Not specified
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Videotaped observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	14

PURPOSE

In a previous paper the authors showed that marijuana intoxication in a small group setting under experimental conditions of frustration was not associated with increased hostility. The present study examines the effects of marijuana on affective communication (other than hostility) within these same groups, as well as marijuana's effects on the ability of the persons in these groups to work together toward a common goal.

METHODOLOGY

A total of 10 marijuana groups and 8 placebo groups were observed. Each group of three paid volunteers met in the laboratory and were asked to create a consensus story about a Thematic Apperception Test (TAT) picture (number 10) after 10 minutes of discussion. Subjects then each smoked a cigarette containing 2 percent tetrahydrocannabinol or placebo, after which the group was asked to develop another story about a second TAT card (number 2) after a 10-minute discussion. As a frustration stimulus, the group was told that the story just created was inadequate and would have to be reworked. A third group discussion ended the experiment, and a debriefing followed. Study material was derived from videotaped observations of each small

group process and consensus story. Each group interaction and consensus story was compared with the other two of the same group. Observations focused on the affective communication between group members; the ability of the group to work together in solving a problem; and the elaboration, originality, and creativity of the consensus stories in comparison to the stories of placebo subjects. All observations were made on a double-blind basis, although it was sometimes possible to identify groups of marijuana smokers.

RESULTS

Placebo groups were essentially unchanged after smoking. Marijuana smokers, however, differed markedly from their predrug behavior. Of the 10 groups 8 seemed more relaxed, less serious, and more friendly after smoking. The other two began in a relaxed manner and continued in that fashion. In all groups there was considerable laughter, joking, and sarcasm. Task-oriented communications were replaced by increased sharing of personal information, with little attention to the task at hand. The stories produced were consistently meager, stereotyped, or silly. In no case was the story produced by a marijuana group considered to be more creative, original, or even more elaborate than the story produced either by the same group prior to smoking or by any placebo group.

Placebo groups reacted to frustration by becoming more serious and task-oriented, as well as increasingly hostile. Marijuana groups also became more task oriented, but without hostility. Many of the groups seemed "nonintoxicated" after frustration. Despite increased goal orientation in the groups after frustration, the reworked stories were not more creative than the original stories of the same group. After completion of the discussion, the marijuana groups returned to relaxed, good-natured conversation. They appeared to be able to control their intoxication and to work toward a common goal, returning to an informal, intoxicated group style when the task had been completed.

CONCLUSIONS

Marijuana increases laughter and social-emotional communication. At the same time, individuals can compensate and temporarily control moderate marijuana intoxication on demand, becoming able to collaborate consensual solutions to problems. However, marijuana does not increase creativity. Marijuana's effect in individuals in small group settings may be dependent on a multidimensional relationship between the active intoxicant, individual psychological factors, setting, and the demand characteristics placed upon the smoker or group of smokers. Without performance expectations, group problemsolving was sacrificed to social-emotional behavior. Frustration restored the group's ability to work together in a goal-oriented manner.

Segal, B. Reasons for marijuana use and personality: A canonical analysis. Journal of Alcohol and Drug Education, 22:64-67, 1977.

DRUG	Marijuana
SAMPLE SIZE	118
SAMPLE TYPE	College students
AGE	17 to 27 years (median age: 18 years)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Alcohol Drug Use Research Survey; Omnibus Personality Inventory; Family Orientation Scale; Sensation Seeking Scale
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	5

PURPOSE

Why college youths use or experiment with marijuana is a persistent research question. Despite the many explanations for marijuana use, little empirical research has focused on developing a systematic understanding of the relationship between reasons for using marijuana and personality characteristics. This study used canonical analysis to explore college students' self-reports of reasons for using marijuana and to relate these self-reports to personality variables.

METHODOLOGY

The sample consisted of 78 female and 40 male college students drawn from an initial sample of 320 subjects. Only individuals reporting marijuana use were chosen for the study. The subjects ranged from 17 to 27 years old, with a median age of 18. The greatest number were freshman, but all classes were represented. All subjects were administered four instruments. The Alcohol Drug Use Research Survey was designed to obtain demographic information and basic information on the kinds of drugs and alcohol used by respondents. Subjects were asked about the extent, duration, and frequency of use of a variety of substances, as well as reasons for such use. A total of 33 questions related to reasons for marijuana use. The Omnibus Personality Inventory

is a 385-item scale assessing attitudes, opinions, and feelings on a variety of subjects. The Family Orientation Scale is a 45-item scale measuring 4 factors: parental control, the fostering of independence, family communication, and family relationships. The Sensation Seeking Scale contains 72 forced-choice items measuring general sensation seeking, thrill and adventure seeking, experience seeking, and disinhibition. Its fifth scale, for males only, was not used. Canonical analysis was used to determine the nature of the relationship between reasons for using marijuana and the 22 personality variables used in the study.

RESULTS

The analysis indicated one significant linear combination of personality and marijuana use variables. Examination of the marijuana use variables showed that usage is clearly associated with enhancing interpersonal experiences and that marijuana may serve as a social lubricant in much the same way alcohol does. The main reasons cited for using marijuana were to experience the high and to satisfy curiosity about what the experience would be like. Other reasons were making parties more fun, helping users forget about not being the persons they would like to be, feeling mad, helping the user feel better, and helping the user relax. Within the personality domain, the most important factors relating to marijuana use were experience sensation seeking, general sensation seeking, disinhibition sensation seeking, and impulse expression. Other important variables were the seeking of thrills and adventure, estheticism, complexity, autonomy, and lack of practical outlook.

CONCLUSIONS

Results indicated that marijuana use stems from three main interrelated reasons: to deal with self-concept difficulties or conflict, to enhance positive experiences, and to enhance social relationships. These were significantly correlated with personality variables that represented seeking new or diverse experiences. The findings were consistent with prior research showing those who use marijuana as tending to be open to new experiences. Thus, marijuana use is consistent with curiosity and the desire for a new experience--the high. These findings aid the understanding of the relationship between marijuana use and personality and promote the development of possible alternatives to marijuana use.

Weckowicz, T.E.; Collier, G.; and Spreng, L. Field dependence, cognitive functions, personality traits, and social values in heavy cannabis users and nonuser controls. Psychological Reports, 41:291-302, 1977.

DRUG	Marijuana
SAMPLE SIZE	48
SAMPLE TYPE	Users versus nonusers
AGE	Young adults (mean age: 22.5 years)
SEX	Male
ETHNICITY	White
GEOGRAPHICAL AREA	Canada
METHODOLOGY	Survey--comparative
DATA COLLECTION INSTRUMENT	Personality, values, and cognitive functioning tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	64

PURPOSE

Although a number of studies have suggested that cannabis use is clearly associated with cognitive and emotional deterioration, more controlled studies in nonmedical settings, using cannabis smokers who did not seek medical or psychiatric help, have cast some doubt on the validity of these reports. A 1973 study by Weckowicz and Janssen found that, contrary to their prediction, heavy marijuana smokers were more field independent than were nonsmokers. Other data showed that marijuana smokers performed at a higher level of cognitive functioning in 8 of 11 tests, while personality and value tests showed that marijuana smokers tended to conform less to the values of the dominant culture, showed some rebelliousness and nonconformity, and were perhaps alienated from established society. Results also showed that marijuana users were less rigid and performed better on esthetic judgment tests. These results required cross-validation, however, due to the small sample and the homogeneity of the population involved.

The present study represents an extended cross-validation of this previous study, using a larger and more heterogeneous sample, improved procedures, and a few additional tests. The study hypothesis was that field-independent individuals are more likely to experiment with the use of illicit drugs.

METHODOLOGY

The sample consisted of 24 young males who were heavy cannabis users and 24 nonusers. Subjects were Canadian or British-born Caucasians of Anglo-Saxon or mixed European extraction. Each of the marijuana-smoking subjects had smoked marijuana about 1,200 times; most had also taken psychedelic drugs such as LSD, mescaline, or psilocybin, and some had experimented with heroin, cocaine, or other drugs. The 24 controls had no history of marijuana or drug use. The two groups' mean age was 22.5, with an average of 13.5 years of education. Subjects were administered 29 tests to measure field dependence, selectivity of attention, cognitive functioning and convergent thinking, esthetic judgment, mood, personality, and social and political values. Most of the tests had also been used in the previous study. Multivariate analysis was used to examine the data, which was grouped into nine categories of variables. Hotelling's T^2 test was used to test the differences between means of the scores in these nine groups. Differences among individual variables were analyzed using univariate analysis of variance. Analysis of covariance and other methods were used for certain comparisons as well.

RESULTS

Since most of the individual comparisons failed to reach significance, the results are suggestive rather than definitive. Findings indicate that those who use drugs tend to be more introverted, self-accepting, radical, and more critical of social systems than controls, who placed more value on responsibility, self-control, national security, and economic interests. Further, users tended to place a higher value on honesty, freedom, imagination, and art. Results are consistent with those of the previous study in that cannabis users showed no apparent intellectual deterioration; tended to be more field independent; and performed better on tasks designed to measure selectivity of attention, general cognitive functioning, diversity and originality, and esthetic judgment.

CONCLUSIONS

It cannot be implied from the findings that smoking marijuana will make individuals more intelligent, field independent, or creative. Causal relationships can neither be proved nor disproved, and the findings are compatible with more than one theoretical explanation. For example, an alternative explanation is that field-independent individuals are more likely to experiment with cannabis and other drugs than those who are field dependent. Such individuals are more flexible and divergent in their thinking, have more inquiring minds, and are therefore more likely to experiment with illicit drugs. Another less likely possibility is that the lifestyle associated with chronic marijuana use among gifted and privileged individuals may produce a cognitive style characterized by field independence, flexibility, divergent thinking, and greater esthetic appreciation. Either explanation would argue against the taking of drugs to achieve field independence or reach a higher level of cognitive functioning.

Brown, A., and Stickgold, A. Marijuana flashback phenomena. Journal of Psychedelic Drugs, 8(4):275-283, 1976.

DRUG	Marijuana
SAMPLE SIZE	16
SAMPLE TYPE	Users
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Case studies
DATA COLLECTION INSTRUMENT	Telephone conversations; interviews
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	16

PURPOSE

As marijuana use spreads into the older adult community, physicians and psychologists are likely to be confronted with people complaining of self-diagnosed marijuana flashbacks (i.e., spontaneous recurrences of feelings ordinarily accompanying the use of marijuana). Therefore, to augment the technical literature on flashback phenomena and to provide physicians with information on a potentially growing problem, 13 case studies are categorized and detailed.

METHODOLOGY

The 13 cases were reported through the drug abuse hotline of a midwestern city. Being the only such service available and receiving 95 to 97 percent of the drug-related emergency calls in the metropolitan area, the hotline tended to have a socially and occupationally homogenous clientele. The only common factor in all the cases was the self-diagnosis of marijuana flashback. In some instances, the sum total of data consisted of the written record of the call, but in most cases the caller participated in the activities of the affiliated crisis center and submitted to in-depth interviews.

RESULTS

The 13 cases can be divided into 5 major categories that describe both the most obvious psychological symptoms and their etiological implications.

Prolonged anxiety reactions. Marijuana may occasion acute anxiety reactions as a result of unexpected loss of control over voluntary movement and mental activity, conflicts with users' conscious or unconscious moral code, and fear of police involvement and the concomitant social scandal. The cases of self-proclaimed marijuana flashbacks presented as anxiety attacks seem to occur typically in one-time-only users. The uncomfortable feelings experienced by older experimenters with rigid self-images are similar to the dysphoria observed in first-time heroin usrs who do not enjoy the free-floating sensation. Two cases illustrate the use of marijuana with negative aftereffects of a minor nature by an immature individual trying to free himself from his rigid moral code and by a 36-year-old divorced mother trying to be sophisticated with her teenage son.

Precipitation of psychotic reactions. The effects of marijuana, particularly at high doses, have occasionally been connected to the precipitation of psychotic reactions in certain users, either by unleashing previously inhibited acting-out behavior or by exposing the user to previously repressed material. Callers in this category tended to be in their early twenties, to have significant psychiatric histories of characterological or behavioral disorders, to be multiple-drug users poorly adjusted to their life situations, and generally to be able to accept help but to do poorly in therapeutic situations. The cases presented demonstrate the reaction of a schizophrenic young woman, the isolated hallucinations of a young mother's postpartum reaction, and the paranoid schizophrenic psychosis of a young self-declared homosexual.

Hallucinosis. A third group of callers experienced mainly visual hallucinations without a concomitant loss of orientation or a more global thought disorder. The individuals tended to be well-adjusted, heavy to moderate users of marijuana currently undergoing realistic life stress, and reporting physical exhaustion. All members of this group had previously experienced perceptual and spacial distortions under the influence of marijuana on at least one occasion. The current sensations experienced by these users were at once frightening and sensational, only occasionally evoking panic. Callers recognized the unreality of their hallucinations and perceived a connection between the distortions and marijuana use. The period of vulnerability lasted from 1 to 4 months, with an attack frequency ranging from 1 to 20 occurrences. Cases tended to remit without psychological intervention. The four examples represent cases of persistent visual illusions and two white-outs of the type typical for LSD flashbacks.

Enhanced appreciation of environmental stimuli. A number of individuals called the hotline reporting that they felt as if they were intoxicated when listening to music or undertaking a project with great intensity. These reactions apparently represent learned variations in the user's lifestyle, a recurrence of new perceptual awareness first gained while using marijuana. The episodes may also simply be illusions that a perceived situation has occurred before. The ages of callers varied, and they tended to have no psychiatric history of symptoms. No case study of this type is presented, as the callers tended to be pleased with the pleasant experience.

Questionable cases. A large number of calls to the crisis center were indexed as marijuana flashbacks, although they did not fit into any of the four categories. The callers may have experienced psychotic reactions or reactions to the use of other drugs; they may also have been cranks or inexperienced hallucinogen users. Such cases are in the middle range of the callers with varying psychiatric histories, symptoms, and diagnoses; the callers usually rejected help and did not attend followup therapy. Four examples of dubious cases represent individuals suffering from attacks of uncontrollable hilarity, compulsive fixation on objects, periods of sedation, and sensations of free-floating anxiety accompanied by hot and cold flashes and distorted time sense.

CONCLUSIONS

The diversity of etiological considerations in the hotline cases presented makes the accuracy of the users' flashback diagnosis questionable. Moreover, most cases of the types described are not characterized by gross psychiatric impairment and can be settled by supportive intervention, so that antipsychotic medications and traditional psychotherapy are unnecessary.

Chopra, G.S., and Jandu, B.S. Psychoclinical effects of long-term marijuana use in 275 Indian chronic users. A comparative assessment of effects in Indian and USA users. Annals of the New York Academy of Sciences, 282:95-108, 1976.

DRUG	Marijuana
SAMPLE SIZE	292
SAMPLE TYPE	Chronic users
AGE	Young adults; mature adults
SEX	Not specified
ETHNICITY	Indian; American; European
GEOGRAPHICAL AREA	India
METHODOLOGY	Exploratory/descriptive survey; comparative
DATA COLLECTION INSTRUMENT	Interviews; medical and psychological tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	11

PURPOSE

Despite keen public and professional interest in the adverse reactions and complications that result from chronic use of cannabis drugs, the description and documentation of associated medical and psychological effects have seldom gone beyond generalizations. The present study reports the results of medical and psychological tests on a number of long-term cannabis users and compares the effects in Indian and American chronic users.

METHODOLOGY

The sample consisted of 275 chronic cannabis users in India and 17 alienated youths ("hippies") from America and Europe who had come from Nepal to India and had used cannabis drugs regularly for periods of 6 months to several years. Subjects were examined immediately after they had taken the drug and again after the effects had disappeared. Routine physical and neurological examinations were performed, during which individuals were subjected to intense interviews concerning their histories of drug abuse, dosage, frequency and duration of use, family, friends, interest in work, and the perceived effects of marijuana. Personality, mood, attitudes, and emotional stability of the subjects were also evaluated. Subjects were divided into four

groups by age, dose, and duration of use. Educational levels, ages, vocations, income, and the mean daily doses of delta-9-tetrahydrocannabinol (THC) varied widely.

RESULTS

Of the 275 subjects, 29.09 percent believed that marijuana had no adverse effects on their health and work capacity, 23.6 percent noted minor impairment, 43.63 percent complained of marked impairment, and 3.84 percent claimed improvement. Common health conditions linked with marijuana use were laryngitis, pharyngitis, asthma, irritation cough, dyspnea, increased appetite, dyspepsia, and minor liver damage. In longstanding cases, especially in the older groups, such symptoms as malnutrition, anemia, poor skin condition, congestion of ciliary vessels, and discoloration of conjunctiva were observed.

Most of the subjects took the drug to become mildly intoxicated and to relax. Adverse effects were most common in the younger groups, which consisted of individuals with histories of psychological problems. Prolonged marijuana use in large doses could induce psychosis in individuals with psychotic thresholds. Other adverse effects included hallucinations and psychomimetic effects. Wide variations were found in reactions among different individuals and within the same individual, depending on dosage, mood, personality, and psychopathology, although reactions subsided after the drug wore off. According to information provided by friends, relatives, and employers, chronic intoxication led to confusion, disturbances in work performance, and lack of interest in families.

Overall, marijuana use tended to cause depression and apathy, but continued high doses sometimes produced increased locomotor activity and aggressive behavior. Subjects using small doses were first apathetic and disinterested in their surroundings; permanent behavior alterations followed, resulting in an amotivational syndrome. Excessive use was associated with personality inadequacies; heavy cannabis users tended to be individuals exhibiting emotional immaturity, low frustration tolerance, and inability to assume responsibility. While chronic addicts were often poor and resorted to theft to sustain themselves, cannabis frequently acted as a deterrent to premeditated crimes because of its depressive effects. Low doses of the drug were believed to enhance sexual enjoyment and performance, but chronic use of the drug led to lack of desire and inability to perform. Fertility rates were lower than normal among cannabis users but higher than in opium addicts. Subjects acquired tolerance to each dosage within a few days after each increment. Cessation of the drug produced withdrawal symptoms, although mild, within a few hours of abstinence. In addition, with higher doses, work performed showed decreased accuracy and a decline in coherence and clarity. Impairment resulted from difficulty in maintaining a logical train of thought.

Acute somatic toxicity of cannabis drugs was low when compared to that of other simple chemical substances rapidly absorbed in their pure form in the gastrointestinal tract. Cannabis appeared to produce little or no morphological changes in the brain, but alterations in sensitivity of brain cells, distortions in brain cells' functions, and possibly even permanent changes in thinking patterns sometimes occurred.

The intensity of the chronic effects of marijuana usage, as observed in India and Africa, has not been reported by Western observers. The milder preparations of cannabis used in the West partially explain the absence of such psychoses. However, the use of cannabis drugs by certain sectors of the population in the developing countries can be compared to the use of alcohol in the West. Distinctions must be made between occasional users, moderate users, and users who indulge excessively and are prone to psychosis. Most users in the United States and Canada belong to the first two categories, which explains the low frequency of acute toxic reactions in those countries. In India, the highest percentage of excessive hemp users come from the unemployed, low-income classes, and students; these individuals tend to be passive, nonproductive, and prone to psychosis. The role of cannabis is also culturally determined; cannabis is used for religious purposes in Africa and South America; for artistic stimulation in a number of cultures; and for relief of fatigue, monotony, and boredom in others.

CONCLUSIONS

Despite the rapidly changing scene of cannabis drug use, the drug is still used most commonly in India by uneducated, low-income individuals, in whom adverse reactions are most common.

In contrast, cannabis users in the United States are usually college students from the middle classes. Results of extensive testing of heavy cannabis users suggest that the drug may precipitate latent psychiatric disorders, aggravate preexisting psychiatric problems, or both, particularly over long periods of use.

Cohen, S. The 94-day cannabis study. Annals of the New York Academy of Sciences, 282:211-220, 1976.

DRUG	Marijuana
SAMPLE SIZE	30
SAMPLE TYPE	Volunteers
AGE	21 to 35 years
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Los Angeles, California
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Medical and psychological tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	13

PURPOSE

Long-term physiological effects of cannabis on human subjects are reported on the basis of research conducted at the Marijuana Research Ward of the School of Medicine of the University of California at Los Angeles.

METHODOLOGY

The sample consisted on 30 male paid volunteers, 21 to 35 years of age, with a history of moderate to heavy marijuana use. Subjects had for the last 6 months smoked less than 10 tobacco cigarettes per day, taken no more than 3 drinks per week, or no more than 4 nonmedical exposures to drugs, and smoked at least 3 marijuana cigarettes per week. None of the subjects had histories or symptoms of significant physical or mental illness.

Subjects were required to abstain from alcohol, tobacco, and any drugs not provided by the staff for a 94-day period. The first phase of the experiment consisted of an 11-day preintoxication period to make baseline measurements and to familiarize subjects with the ward routine. The second phase was a 64-day intoxication period during which subjects smoked at least one

cigarette containing 20 mg of tetrahydrocannabinol (THC) daily. In the next phase of 7 days, marijuana was withheld and withdrawal effects measured. Finally, a second 9-day intoxication period was followed by a 3-day detoxification and debriefing period. During intoxication periods subjects consumed a mean of 5.2 cigarettes daily--an average exposure of 103 mg THC.

Numerous studies were performed, including echocardiography, chromosome investigations, skin testing for immune response, testicular and adrenal hormone assays, a complete battery of opthalmologic examinations, and multiple pulmonary function tests. Psychological tests measured verbal and nonverbal intelligence, spatial orientation, psychomotor skills, and personality factors. Blood, urine, and sputum tests were performed to assay cannabinoid content. Subjects were also paid to complete two work assignments. Work was performed during intoxication and nonintoxication periods to determine both speed and error levels under each condition.

RESULTS

No general conclusions could be drawn regarding work output, as the volunteers were not typical marijuana users. However, learning effects continued over the entire 94-day period. Total responses, total correct responses, responses per hour, and percentage of correct responses all continued to increase over the study period, regardless of whether the subjects were intoxicated or not.

The smoking of 2 to 10 cigarettes for 6 to 9 weeks produced a mild but significant narrowing of the smaller and larger airways, possibly due to chronic irritation. Nevertheless, the airways dilated after the smoking of a cannabis cigarette. In fact, THC proved effective in relieving bronchospasms of asthmatics. In addition, cannabis did not, as popularly believed, dilate pupils, and it produced a dose-related clinically significant reduction in intraocular pressure in normal patients. No significant differences in the frequency of chromosomal breakage were found when comparing baseline and postsmoking samples of venous blood. Marijuana use did not, moreover, appear to have a substantially adverse effect on the B or T cells, and therefore on the immune response. However, a significant depression in plasma testosterone levels was observed in the second and third hours after subjects smoked marijuana cigarettes. Testosterone levels remained chronically low during smoking phases, rising again during periods of abstinence.

The acute effects of marijuana produced an increase in cardiac output due to the well-known chronotropic effect, although the tachycardia disappeared with chainsmoking, indicating tolerance to the chronotropic effect. Numerous measurements of cardiopulmonary function revealed that higher workloads could be performed before marijuana smoking than after smoking. Electrocardiographic changes occurred in a high percentage of subjects when marijuana and exercise were combined.

Marijuana may alter the relative roles of the right and left cerebral hemispheres during cognition. The drug was found to produce a differential effect on tasks that are lateralized to the right or left hemisphere; performance on left-lateralized, verbal-analytic tests was significantly impaired, while performance on right-hemisphere, nonverbal-holistic tasks was significantly improved. Subjects with variable distribution of functions between their hemispheres seemed to show significantly different patterns of response to marijuana intoxication. The computer-analyzed electroencephalogram could distinguish between abstinent marijuana smokers and age-matched nonusers. Heavy smokers could, with lesser accuracy, be differentiated from moderate smokers. Pronounced differences existed between preintoxication and postintoxication states. Radioimmunoassay techniques established that urinary THC peaked 2 to 4 hours after smoking and was still detectable in small amounts 48 hours after the last use of marijuana.

CONCLUSIONS

Certain findings (i.e., reduction in intraocular pressure and brochodilation) may signal therapeutic effects of marijuana use. However, effects such as lowering of testosterone and narrowing of airways indicate that marijuana use may also produce undesirable side effects. Contrary to reports of other researchers, this study did not show marijuana to alter immune response or chromosomes. The hemispheric lateralization effects and the electroencephalographic changes from marijuana use represent new knowledge about cannabis effects on humans.

Comitas, L. Cannabis and work in Jamaica: A refutation of the amotivational syndrome. Annals of the New York Academy of Sciences, 282:24-32, 1976.

DRUG	Marijuana (ganja)
SAMPLE SIZE	231
SAMPLE TYPE	Users and nonusers
AGE	Not specified
SEX	Male
ETHNICITY	Jamaican
GEOGRAPHICAL AREA	Jamaica
METHODOLOGY	Ethnographic/participant observation; clinical observation
DATA COLLECTION INSTRUMENT	Observations
DATE(S) CONDUCTED	June 1970-February 1972
NO. OF REFERENCES	10

PURPOSE

The amotivational syndrome is a set of symptoms, including apathy, ineffectiveness, and nonproductiveness, considered to reflect a deficit in general motivation. It has been attributed to the chronic use of certain drugs. Clinical research on marijuana's relationship to this syndrome is inadequate because it has rarely dealt with questions of predrug personality, cause-and-effect relationships, and the social and cultural specifics of the subjects. Research supporting the existence of the amotivational syndrome assumes that marijuana smoking is sufficient indication of some deep underlying psychologic problem, tries to show that marijuana is a catalyst to psychoses, or tries to show that marijuana use is a direct cause of psychosis. This paper refutes the concept of an amotivational syndrome by providing examples from Jamaican society, where cannabis has been in widespread use among the working class for a long time but where passivity and withdrawal from everyday work does not exist and where the amotivational syndrome does not obtain. Instead, it is a society in which many believe cannabis to have motivational effects in terms of initiating socially productive activity, sustaining ongoing activity, and channeling activity within a prescribed course.

METHODOLOGY

From June 1970 through February 1972, the Research Institute for the Study of Man, in collaboration with the University of the West Indies, conducted a multidisciplinary study of the effects of marijuana, or ganja, on chronic users in Jamaica. Two methodologies were used. A social science and field-based approach had ethnohistoric, anthropologic, and sociologic components. A clinical and hospital-based approach had medical, psychiatric, and psychologic components. The social science team studied seven communities for about 6 months each. For the clinical studies, 60 adult working-class males from 4 of the 7 study communities were chosen by the social scientists to be study subjects. A total of 30 were ganja smokers with 10 or more years' cannabis experience and 30 were nonsmokers, matched for age, socioeconomic status, and residence. The subjects were admitted to University Hospital for 6 consecutive days of medical, psychiatric, and psychologic examinations. Both self-reported and objective data were used in the analysis.

RESULTS

The conviction among the ganja-using population that ganja is a beneficial substance is fundamental to the belief system that shapes and supports the Jamaican ganja complex. Users have a wide range of beliefs related to ganja's potential effects on most emotional and physical states. They uniformly believe that ganja enhances the ability to perform hard work, and they regularly consumed it with this goal in mind. Ganja is believed to have a cumulative benefit in "building" one's blood and strength and in producing an immediate outburst of energy sufficient for completing laborious tasks. Users disagree about the conditions under which ganja should be consumed for optimum effectiveness. Nonusers studied also noted an increase in work drive among smokers. Detailed analysis of the life histories of the 60 subjects chosen for clinical analysis indicated that ganja had no negative effect on work history or motivation.

Videotapes of ganja-using rural cultivators indicate that ganja smoking is related to changes in the rate and organization of body movement and the expenditure of energy. Behavior change gave the impression of determined effort and the ability to perform arduous work better. A case example involving 12 farmers who were plowing a field demonstrated that both moderate and heavy smoking reinforced social cohesiveness during group work. Behavioral changes related to light or moderate smoking did not appear to be significant in agricultural work over extended time periods. In contrast, behavioral changes related to heavy ganja smoking were significant in agricultural work. However, it appeared that some heavy users worked longer and expended more kilocalories to weed, hoe, and turn soil after smoking. A comparison of 77 ganja-using and 82 nonusing cane cutters on a large Jamaican sugar estate over an entire reaping season showed no statistically significant differences in the work productivity of ganja smokers and nonsmokers.

CONCLUSIONS

Results clearly showed no signs of apathy, ineffectiveness, nonproductiveness, or deficits in general motivation among Jamaican laborers. This conclusion was strongly confirmed by the results of scores of the psychiatric and psychologic examinations given to the clinical sample of 60 persons. Instead, ganja was associated in users' minds with a "motivational syndrome," even though motivation to work need not be correlated objectively with exact levels of productivity. Other scattered data from as long ago as 1894 indicate that Jamaica is not unique in the patterns and beliefs described and that these elements occur or have occurred in many cannabis-using agricultural societies with a long history of use. Such observations have been made about Africans, workers in the southwest of the United States and Mexico, black dock hands in New Orleans in the 1920s and 1930s, laborers in contemporary rural India, Khmers of Southeast Asia, Colombian laborers, and urban workers in Greece. Additional cross-cultural field investigations of cannabis use would be helpful in increasing the understanding of both the specific linkage of cannabis to work and, more importantly, the relationship between culture and the patterned use and patterned effects of cannabis.

Crockett, D.; Klonoff, H.; and Clark, C. The effects of marijuana on verbalization and thought processes. Journal of Personality Assessment, 40(6):582-587, 1976.

DRUG	Marijuana
SAMPLE SIZE	81
SAMPLE TYPE	Volunteers
AGE	19 to 31 years
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Thematic Apperception Test
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	12

PURPOSE

Changes in cognitive organization, thought processes, and personality are assumed to be reflected in verbal output. While projective techniques have been traditionally used to measure these subtle changes, studies on marijuana have rarely employed these techniques. This study seeks to determine the effects of varying doses of marijuana on thought processes as reflected in verbal output elicited by pictures of the Thematic Apperception Test (TAT) and the changes associated with repeated administrations of the TAT under varying experimental conditions.

METHODOLOGY

The sample consisted of 81 volunteers, 38 men and 43 women, ranging in age from 19 to 31 years (mean age: 22.51 years). The average intelligence level of the subjects fell in the superior range. All subjects had had prior casual experience in marijuana or hashish; none had used other psychoactive drugs within the past year. Subjects were examined twice with approximately 1 week between sessions. Three drug doses--placebo, marijuana low in THC, and marijuana high in THC--were used in seven experimental conditions. The smoking technique was standardized and controlled. Ten pictures from the TAT were administered by a single examiner in a set

order. Subjects' verbal production in response to each picture was tape recorded and transcribed verbatim. These transcripts were then scored on 13 rating scales derived from psychometric techniques that have been used with a variety of projective tests. The 13 rating scales were divided into 5 specific categories of cognitive and affective content. These categories were (1) changes in thought processes, as measured by the variables of productivity, integration and organization, abstraction, and multiplicity of meaning; (2) control, as measured by the variables of loss of control and restraining of thoughts; (3) emotional tone, as measured by the variables of positive emotions, negative emotions, and anxiety; (4) level and direction of aggression, as measured by internalized and externalized aggression; and (5) sexual content, as measured by the number of sexual themes and the level of blatancy of the responses. The scores for each variable were summed over all 10 cards to represent the overall quality and content of verbal production for each subject. The rating procedure was done independently under blind conditions by two judges. Pearson correlations indicated that the judges differed on the magnitude of the correlations but not on the direction of rating with respect to dosage or trials.

RESULTS

Four variables changed significantly between trials regardless of drug condition or judge: Levels of productivity and anxiety decreased significantly over trials, while abstraction and internalized aggression increased significantly.

Three of the four variables measuring thought process--integration and organization, abstraction, and multiplicity of meaning--showed significant differences under different experimental drug conditions. All three registered significant differences between the drug dosage conditions, while the variables of integration and organization and multiplicity of meaning also showed significant differences according to dosage conditions--the marijuana groups were less integrated than the placebo group, resembling each other but not the placebo group; the low-dose group's responses had more multiple meanings than either the placebo or the high-dose group, which were similar. Additionally, the low-dose group was significantly more abstract than the high-dose and placebo groups, which did not differ significantly. Regarding emotional tone, the high-dose group's responses reflected less anxiety than those of the placebo group, and the low-dose group gave fewer negative affect responses than the placebo group. Variables in the control, aggression, and sexual content categories showed no significant drug-related differences. Multivariate analysis of differences between the groups on specific trials pointed to significant multivariate differences for both trials, suggesting significant separation between the 3 groups in terms of the distribution of scores on the 13 variables.

CONCLUSIONS

Verbal output on the TAT differs significantly for the three groups. Different dosages of marijuana affect the following variables: organizational quality, level of abstraction, multiple meaning, and negative emotions. With respect to trial effects, results suggest that with repeated presentation of the TAT the respondents' thought processes become less disrupted, resulting in more definitive responses in terms of content and level of abstraction. The low-dose subjects appear to resort to abstraction to express anxiety associated with the TAT. However, because of impairment of the subjects' organizational abilities, these abstract responses are confused or have multiple meanings. In contrast, high-dose subjects do not react to the TAT with anxiety, perhaps because of the sedative effects of marijuana, and the decrease in anxiety is not offset by increases in other content variables such as aggression. Consequently, high-dose subjects' responses are more concrete and descriptive in nature than those of the low-dose subjects. The reported disruption in thought processes for both marijuana groups is consistent with findings of other marijuana studies using different measurement instruments.

Dembo, R.; Schmeidler, J.; and Koval, M. Demographic, value, and behavior correlates of marijuana use among middle-class youths. Journal of Health and Social Behavior, 17:177-187, 1976.

DRUG	Marijuana
SAMPLE SIZE	682
SAMPLE TYPE	Junior and senior high school students
AGE	7 adolescents; young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Correlational study; multivariate analysis
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Spring 1974
NO. OF REFERENCES	26

PURPOSE

The two most common views regarding marijuana use by middle class youths are that marijuana use represents a rejection of middle class values and/or that it is disturbed behavior reflecting a sense of alienation or dissatisfaction with family life and the school experience. An alternative viewpoint is that marijuana use represents the lifestyle of a particular youth culture whose beliefs and activities happen to conflict with those of other groups in society.

This research examines the relationship between the range of youths' marijuana use and their attitudes, values, and behaviors to discover whether marijuana use is associated with reinforcing personal and peer beliefs and behavior.

METHODOLOGY

The subjects were 7th through 12th grade students from two suburban junior and senior high schools. Students in both schools completed the study instrument in one class period on the same day in the spring of 1974. A total of 682 students, or over three-fourths of the students present that day, completed the questionnaire.

The questionnaire gathered data on demographic factors and drug use; reactions to drug prevention programs; and attitudes toward parents, peers, schools, risk behavior, and drug use. Questions covered the frequency of use of seven categories of substances, including marijuana and hashish. The findings were regarded as a conservative estimate of drug use, in view of research indicating that youths who do not attend school regularly tend to use drugs more often than those who do. The sample was generally middle class and almost equally divided between males and females.

RESULTS

A small positive association was found between age and the frequency of marijuana use. Socioeconomic status appeared to be relatively independent of marijuana use in the population studied. Similar rates of use were found among both sexes.

A significant positive relationship was found between the frequency of marijuana use and beliefs supporting drug use and favoring drug use decriminalization. Frequent use of marijuana was also associated with the tendency to be disengaged from the family and more oriented toward peers. Findings did not indicate a strong association between the frequency of marijuana use and attitudes toward school or reported grade average. Over half of the nonusers claimed that their friends smoked marijuana, whereas only 2 percent of the marijuana users did not have user friends. Alcohol use was highly associated with taking marijuana.

Students used marijuana, alcohol, and tobacco more than other categories of drugs. While only 7.9 percent of the 621 youths responding to this item claimed to have used marijuana once or more per day during the previous 6 months, these daily users were more likely to have taken other substances than were youths who took marijuana less often or not at all. However, polydrug use did not appear to be a common feature of drug behavior among the daily marijuana users.

A strong tendency was found for marijuana users to regard drug use as an expression of a quest for new sensations. Those using marijuana tended to claim that "wild" parties are fun, that it was fun to do things that were a little frightening, and that new experiences were attractive. The marijuana-using youths in the study had greater tendencies to take risks and to participate in parties and dances than did the students who took marijuana infrequently or not at all.

CONCLUSIONS

The sociocultural view of drug associations among the middle class youths surveyed was supported. The marijuana-taking respondents seemed oriented to a youth culture lifestyle characterized by openness to new experiences and close affiliation with peers and their activities. The factors of rebellion and deviance that may have been responsible for the earlier use of marijuana are less influential today. For many people, marijuana use is not antisocial behavior but a normative activity. Further research should focus on the ways in which marijuana use fits into the lifestyles of various segments of the middle class population and on the social and value factors that influence the manner in which particular groups of marijuana takers are socially categorized and treated.

Dornbush, R.L., and Kokkevi, A. Acute effects of cannabis on cognitive, perceptual, and motor performance in chronic hashish users. Annals of the New York Academy of Sciences, 282: 313-322, 1976.

DRUG	Marijuana; hashish
SAMPLE SIZE	20
SAMPLE TYPE	Long-term hashish users
AGE	Mature adults (mean: 43.5)
SEX	Male
ETHNICITY	Greek
GEOGRAPHICAL AREA	Greece
METHODOLOGY	Multivariate analysis
DATA COLLECTION INSTRUMENT	Digit Span, Barrage de Signe, Time Estimation, Serial Sevens, and Star Tracing tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	25

PURPOSE

Research has documented the acute effects of marijuana in short-term users. Among these effects are temporary impairment of cognitive, perceptual, and motor functions. Complex tasks are more consistently affected than simple tasks, and higher doses have greater effects than low doses.

The acute effects of marijuana in chronic users are still unclear. This study assessed mental functioning in a sample of long-term hashish users in Greece.

METHODOLOGY

The 20 subjects had an average age of 43.5 years and had used hashish for an average of 25.8 years. The subjects received five cannabis preparations (four active substances and one placebo) on 5 different days. The preparations were 0 mg of THC (American THC-free marijuana leaf), 78 mg of THC (American marijuana leaf), 90 mg of THC (Greek hashish), 100 mg of THC in liquid infused on a placebo, and 180 mg of THC (Greek hashish). These preparations were mixed with tobacco and rolled into large cigarettes that appeared identical to those the subjects usually smoked.

The drugs were administered in a semirandom fashion due to the delayed arrival of THC at the Athens laboratories. The 15-minute smoking period was followed by a 90-minute evaluation that assessed psychophysiologic factors, mood, and other continuously measured variables. Psychologic tests were administered from 30 to 50 minutes after smoking and again at 70 to 90 minutes after smoking.

The tests assessed memory, alertness, time sense, mental coordination, and motor performance. Multiple linear stepwise regression was used to analyze the data, comparing each drug against the placebo. Posthoc t-tests were performed if the main effect of the drug was significant. The two testing periods were analyzed separately. No statistical comparison of changes in performance was done.

RESULTS

Three of the five psychologic tests produced significant drug effects at one or both time points. Hashish with the largest quantity of THC (180 mg) usually resulted in the greatest impairment. However, differences in performance were greatest and most frequent with both hashish (180 mg) and marijuana (78 mg).

The effects of hashish were significantly different from those of the placebo as measured by the alertness test, time estimation test, and mental coordination test. The same was true for marijuana (78 mg) and placebo on the alertness and time estimation tests. No statistically significant differences were found for the motor and memory tests.

CONCLUSIONS

The responses on the mental functioning tests for the long-term users in this study and for American short-term users who consumed up to 25 mg of THC were similar. Simple tasks were unaffected, and more complex tasks were affected. Heavy long-term use of cannabis does not change the general response patterns from those shown by occasional, short-term users.

Greenberg, I.; Mendelson, J.H.; Kuehnle, J.C.; Mello, N.; and Babor, T.F. Psychiatric and behavioral observations of casual and heavy marijuana users in a controlled research setting. Annals of the New York Academy of Sciences, 282:72-84, 1976.

DRUG	Marijuana
SAMPLE SIZE	27
SAMPLE TYPE	Casual users versus heavy users
AGE	21 to 26 years
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Current and Past Psychopathy Scales; medical tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	38

PURPOSE

Knowledge of marijuana's effects has been limited to case study reports with serious methodological shortcomings, such as use of nonrepresentative samples and lack of adequate control populations. In view of the confusion surrounding the status of marijuana, research under controlled conditions is needed. The present study investigates psychological, physiological, and performance effects of marijuana on users. Although an amotivational hypothesis is not tested, the data reported are relevant to this issue.

METHODOLOGY

The sample encompassed 27 male volunteers selected on the basis of heavy or casual marijuana use. The first group of 12 casual users ranged in age from 21 to 26 years and reported a mean duration of 5.3 years of marijuana use, with a monthly smoking frequency of 11.5 cigarettes during the past year. The second group of 15 heavy users ranged in age from 21 to 25 years and reported a mean duration of 5.6 years of marijuana use, with a monthly smoking frequency of 42 cigarettes during the past year. All subjects were matched as closely as possible with regard

to socioeconomic background, general intelligence, and level of educational achievement. All subjects were in good physical and mental health.

Subjects lived in a supervised research ward for the duration of the 31-day study. Each subject was used as his own control in the three consecutive phases of the study: a 5-day baseline, a 21-day marijuana smoking period, and a 5-day postmarijuana control period. During all three phases subjects could work at a simple operant task to earn points that could be exchanged for money. Subjects could keep the money or use it to purchase marijuana. Each 1-gram cigarette contained 1.8 to 2.3 percent tetrahydrocannabinol and had to be smoked at the time of purchase under the observation of a staff member. Subjects were not allowed to use drugs other than marijuana. Numerous medical tests were conducted on a regular basis. Clinical assessments were made with the current section of the Current and Past Psychopathy Scales (CAPPS) developed by Endicott and Spitzer and modified to fit the live-in situation. Subjects could work on a portable manipulandum whenever they wished and responses were recorded automatically. To earn points, subjects had to button press on a fixed-interval 1-second schedule of reinforcement.

RESULTS

There was a clear difference between the smoking patterns of heavy and casual users, indicated by the number of cigarettes purchases during the 21-day period of marijuana availability. Casual users smoked an average of 2.6 cigarettes per day, whereas heavy smokers averaged 5.7 cigarettes daily. Both groups showed linear increases in consumption as a function of time.

The heavy user group scored higher than casuals on 11 of the 16 psychiatric assessment categories in the baseline phase, while casual users scored higher than heavy users in only 3 categories. In comparison with baseline measures for CAPPS scores, multiple *t*-tests revealed that casual users showed somewhat more somatic concern toward the end of the marijuana phase, while heavy users tended to be more elated, with an otherwise flatter affect. Subjects perceived their ability to complete routine tasks to be somewhat impaired.

All subjects worked diligently on the operant task. During the predrug baseline period, casual users emitted reinforced responses at a rate well below that of the heavy users group and worked at even lower rates on initiation of the smoking phase. Casual users rates remained stable during the postdrug period. Heavy users exhibited a dramatic drop in response rate when only money was available. Marijuana use often resulted in depressed response rates; such effects were transient, generally lasting no more than 30 minutes after marijuana use. Response rates, when affected, decreased as much as 10 percent from predrug local rates. Rates were often sporadic on the first postdrug day but had recovered to baseline levels by the second postdrug day.

CONCLUSIONS

Few significant chronic or acute behavioral disturbances in subjects with histories of long-term marijuana use are evident. However, a slight trend was seen toward greater psychopathy in subjects with a history of heavy sustained marijuana use. Slight changes in users' emotional states suggest either that regular marijuana use results in affective problems or that people with emotional problems use more marijuana than others. Little correlation was found between the degree of marijuana use and the amount of work done for either money or marijuana, and little evidence was seen of withdrawal effects in the heavy user group. Acute changes in local response rates may reflect a deterioration in motor control, timing behavior, or some other psychological functions, although the general consensus favors alterations in internal timing mechanisms. Marijuana-related deficits in work performance are in any case short lived.

Hansteen, R.W.; Miller, R.D.; Lonero, L.; Reid, L.D.; and Jones, B. Effects of cannabis and alcohol on automobile driving and psychomotor tracking. Annals of the New York Academy of Sciences, 282:240-256, 1976.

DRUG	Marijuana; alcohol
SAMPLE SIZE	50
SAMPLE TYPE	Licensed drivers
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Observations; measures of physiological and psychological parameters
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	28

PURPOSE

Psychomotor abilities that are related to automobile driving and that have been shown to be impaired by cannabis under certain conditions include pursuit tracking accuracy, hand and body steadiness, braking stop time, and start time. Other abilities related to driving that also have been shown to be adversely affected by cannabis at certain doses are short-term memory, vigilance and signal detection, and performance on divided attention tasks. Additional areas, such as effects on judgment and effects of time of use and dosage, are also of interest in terms of cannabis's possible effects on driving ability and traffic safety. The possible interactional effects of cannabis and other drugs such as alcohol also need to be studied.

This paper reports findings and conclusions from two studies regarding cannabis's effects on psychomotor performance and automobile driving ability. In both studies, alcohol conditions were included in the design because certain effects of alcohol on behavior are known and because the known connection between blood alcohol level and automobile crashes has raised concern regarding possible similar effects due to cannabis.

METHODOLOGY

The first experiment was designed to determine the effects of cannabis and alcohol on some automobile driving tasks. A total of 16 licensed drivers (4 females, 12 males) each attended 4 weekly experimental sessions, in addition to a preliminary no-drug practice session. The four experimental conditions consisted of administering placebos (extracted marijuana and a nonalcoholic drink), two levels of marijuana, and one dose of ethanol. Subjects received a standard drink, followed by a 0.4-gram cigarette, each with or without a drug, as appropriate to the condition. Blood alcohol level was measured with a Breathalyzer four times during each session, and the smoking technique was standardized and closely controlled.

The driving trial consisted of six course laps lasting about 6 minutes each, through a 1.1-mile course involving both slow forward and backward maneuvering and higher speed straight and curved sections, marked out with wooden poles and plastic cones. Driving times, hits of cones and poles, and rough handling were measured. Physiologic and psychologic parameters were measured during each session. Included in the test battery were heart pulse rate, visual imagery, Clyde's Mood Scale, Royal Highness inventory, high scale, driving high inventory, a postsession questionnaire, and a morning-after questionnaire.

All subjects were paid volunteers, aged 21 to 30 years, and were mostly university students. They had all used both alcohol and cannabis and had used cannabis a minimum of 1 year or a maximum of 4 years. A separate sample of 12 subjects (3 females, 9 males), who were experienced with alcohol but not with cannabis, were given only the alcohol and placebo conditions and were tested on one driving trial consisting of 6 laps.

In the second experiment, 22 male subjects each attended 6 weekly experimental sessions as well as 2 practice sessions. The six experimental conditions, given to all subjects in double-blind conditions, were placebo, two levels of cannabis, two levels of alcohol, and the low-cannabis and low-alcohol doses combined. Subjects performed six tracking runs, in which they sat in front of a small screen displaying a fixed central horizontal target line and a small circle that continuously moved up and down in a random fashion when the tracking control was at rest. Subjects controlled a "joy stick" and were asked to keep the circle as close to the target line as possible. The distance between the circle and line was the error, and a score was determined for each 3-minute run. Subjects used simple tracking for four runs; complex tracking involved pushing a foot pedal or reversing the joy stick. Physiologic and psychologic measures collected included blood alcohol level, heart pulse rate, visual imagery, Clyde's Mood Scale, a postsession questionnaire, blood pressure, palmar tonic skin conductance, conjunctival injection, depth perception, visual acuity, and time estimation.

RESULTS

Both the alcohol dose and the higher dose of cannabis resulted in poorer car handling performance in the first experiment. Mean number of hits per lap were 13.2 in the placebo condition, 16.8 in the higher cannabis condition, and 17.4 in the alcohol condition. Rough handling during the first trial tended to be greater after drug treatment than in the placebo condition, although only the alcohol scores were statistically significant, and driving time was slowed by the higher dose of cannabis. All but 1 of the 13 experienced cannabis users reported having actually driven when feeling at least as high as they felt when receiving the lower cannabis dose, and 7 reported having driven when feeling at least as high as after the higher cannabis dose. Of the 13 subjects, 11 had driven when feeling as high as they felt after receiving the alcohol dose. About three-quarters of the subjects felt that the higher dose impaired their performance, while their responses after receiving the lower dose were similar to those given after receiving the placebo. Most subjects were able to judge the type and relative amount of the drug received.

Results of the second experiment showed that alcohol results in a clear dose-related increase in errors in simple tracking compared to the placebo condition. The higher cannabis dose, but not the lower dose, also resulted in a significant increase in error scores. The combination of low cannabis and low alcohol produced error scores that were not significantly different from those obtained in the low-alcohol condition. In the trial given 4 hours after drug administration no consistent drug effects on error scores were found. Only the higher cannabis dose, the higher alcohol dose, and the combination of low cannabis and low alcohol produced increased error scores for complex tracking compared to placebos. The combination of low alcohol and low cannabis produced greater error scores in complex tracking than did either drug alone. Foot

choice reaction time was faster in the placebo condition than in any of the drug conditions, but only alcohol produced a statistically significant difference. Overall, alcohol and cannabis both produced physiological and perceptual changes.

CONCLUSIONS

Both studies showed ways in which cannabis can affect performance, as well as differences in the effects of cannabis and alcohol. Results indicated that alcohol, cannabis, and a combination of both can reduce psychomotor tracking performance. The more pronounced effect on complex tracking resulting from the combination of the drugs suggests that the effects of the drugs combine on this measure. Effects of the two drugs appeared to be additive on some of the other measures as well. In addition, the drugs did not appear to affect the level of attention required to perform the choice reaction test. However, a detrimental effect of both the higher cannabis dose and the alcohol dose was seen on car handling performance. Further, lack of major differences on the rough handling scores suggests that the drug effects on performance are not dramatic at the doses used in the study. This conclusion is limited, however, by the artificial nature of the study and subjects' awareness that they were performing and under observation. Nevertheless, results indicate the possibility that cannabis may adversely affect traffic safety and point to the need for additional research on this issue.

Janowsky, D.S.; Meacham, M.P.; Blaine, J.D.; Schoor, M.; and Bozzetti, L.P. Marijuana effects on simulated flying ability. American Journal of Psychiatry, 133(4):384-388, 1976.

DRUG	Marijuana
SAMPLE SIZE	10
SAMPLE TYPE	Airplane pilots who used marijuana socially
AGE	Young adults; mature adults (range: 21-40)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Determination of pulse rates; self-reports; videotaped observations; instrument flight simulator
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	15

PURPOSE

Almost no information is available on marijuana use by airline pilots. Informal contacts have revealed that some pilots do smoke marijuana socially and that some have flown airplanes while high on marijuana.

This study examined the effects of smoking social marijuana doses on the ability of experienced pilots to operate an airplane flight simulator.

METHODOLOGY

The subjects included seven professional pilots and three private pilots who had smoked marijuana socially for several years. The subjects were all males aged 21 to 40. Three smoked marijuana twice a week or less at the time of the study, while seven smoked marijuana three or more times a week.

The pilots were given practice in using the simulator and in performing four specific flight sequences requiring a high level of flying skill. The four sequences lasted 4 minutes each.

A randomized double-blind crossover design was used to compare the effect of active versus placebo marijuana. The pilots smoked either the active or placebo marijuana in a pipe for 10 minutes using a standardized smoking technique consisting of 10 seconds of inhalation, 20 seconds of holding the breath, 5 seconds of exhalation, and 5 seconds of normal breathing. The marijuana contained 2.1 percent THC, and was given in a dose of 0.09 mg THC per kg. Thirty minutes after smoking, the pilots performed the flight sequences.

The pilots' pulse rates and their self-ratings of intoxication levels were recorded. Videotapes of the flight sequences were taken both before and after smoking. Major errors such as getting lost and exhausting the fuel supply, as well as minor errors such as making altitude or heading mistakes and deviating from the prescribed pattern, were recorded. The performances of six of the pilots were also evaluated 2 hours, 4 hours, and 6 hours after smoking, with each pilot used as his own control.

RESULTS

Eight of the pilots could distinguish the placebo from the active marijuana. Most of the pilots rated their level of intoxication after smoking marijuana as slightly greater than their usual social high. Individual performance varied considerably from pilot to pilot and from variable to variable.

Most pilots felt that the flying task was more challenging when they were intoxicated and did not believe that they had adequately compensated for any drug-induced defects. The measurements confirmed that all of the pilots showed a significant drop in performance on all measurements 30 minutes after smoking active marijuana. The average pulse rate and major and minor errors were all significantly greater after smoking active marijuana.

The six pilots who were evaluated for 6 hours showed a nonsignificant drop in flying performance 2 hours after smoking the active drug; by 4 hours, performances had returned to baseline levels. Their flying performances were relatively consistent for the 6 hours after they had smoked placebos.

CONCLUSIONS

Smoking a moderate amount of marijuana causes significant deterioration in simulated instrument flying ability for at least 30 minutes in experienced pilots. The effect probably lasts for 2 hours and disappears in 4 hours.

More subtle effects may conceivably persist for longer periods in actual flight situations or in more complex simulated conditions. This experiment did not measure the effects of altitude and pressure changes on the stress levels of intoxicated pilots. Under actual flight situations, which would not entail memorized sequences as used in the experiments, pilots would probably be even more adversely affected by marijuana intoxication.

Specific factors related to problems experienced by the pilots appeared to be marijuana's ability to affect short-term memory, the sense of time, and concentration and attending behavior. The effects of marijuana on flying may be a sensitive indicator of marijuana's psychomotor effects because of the multiple requirements of the flying task.

The data do not support safe instrument flight for at least 4 hours after smoking marijuana.

Knight, F. Role of cannabis in psychiatric disturbance. Annals of the New York Academy of Sciences, 282:64-71, 1976.

DRUG	Marijuana
SAMPLE SIZE	Not specified
SAMPLE TYPE	Users versus nonusers
AGE	Not specified
SEX	Not specified
ETHNICITY	Jamaican
GEOGRAPHICAL AREA	Jamaica
METHODOLOGY	Clinical observation; statistical analysis
DATA COLLECTION INSTRUMENT	Observations; program/clinical statistics
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	10

PURPOSE

Jamaica is characterized by extensive cultivation of cannabis, largely for export, and by endemic cannabis consumption. The smoking or drinking of the drug is widespread among the working classes, and in recent years its use has spread to the middle classes, university students, and high school adolescents. Jamaica is also the home of the Rastafarians, a religious group attractive to rebellious adolescents who may or may not also have borderline psychotic illnesses. These features of Jamaican life and culture, in addition to the virtual absence of hard drug users, make it the ideal location to study the effects of cannabis. This paper examines possible relationships between psychiatric illness and cannabis usage, using data from two controlled studies of cannabis users conducted between 1970 and 1972 and on several years of clinical observation.

SUMMARY

A study of 30 chronic male cannabis users and 30 matched controls in Jamaica did not reveal any active psychiatric disturbance or organic deficit. The two groups did not differ significantly on physical, physiologic, and psychometric tests or electroencephalographic examinations.

Another study comparing 16 chronic smokers with 10 controls was repeated with 28 subjects and found no chronic effects on physiologic and psychological functioning. A study of admissions to a Kingston Psychiatric Hospital concluded that cannabis could not be implicated as a factor contributing to psychiatric illness but did not provide enough evidence on which to base this conclusion.

Clinical observation suggests that cannabis is implicated in some types of psychiatric disturbance. A record of admissions to two urban and four rural hospitals in Jamaica is examined along with details of individual cases. One-third of the male admissions to the psychiatric hospital had used cannabis. Of 74 males admitted to another psychiatric service over a 12-month period, 29 had used cannabis. Of these patients 10 were diagnosed as having "ganja (cannabis) psychosis," and 4 others were classified as having "marijuana-modified mania." At another psychiatric service, 54 of 223 admissions (24.2 percent) for functional psychosis presented with cannabis usage as a contributory factor. These 54 patients included 14 cases of hypomanic reactions and 7 cases of depressive reactions. At 3 other rural hospitals, psychiatric admissions for psychosis showed 11 of 51, 7 of 18, and 39 of 75 patients, respectively, in whom cannabis was considered directly responsible.

Two case studies illustrate hypomanic problems after cannabis use. A 29-year-old male technician with a previous reputation for an easygoing manner was brought by force to the local hospital after suddenly becoming short-tempered and threatening and disrupting colleagues' work. He improved rapidly while in the hospital, and confessed to having started smoking cannabis 4 weeks earlier. A 16-year-old boy experienced a "bad trip" on the first and only time he smoked cannabis. He later experienced feelings of unreality as well as a form of sleep paralysis. These symptoms continued for 3 years before he began to remain consistently well.

Ganja psychosis has several aspects, including a history of disturbed, sometimes aggressive behavior after several days of unaccustomed cannabis use; schizophrenic features such as blunted affect, withdrawal, bewilderment, hallucinations, and paranoid ideation; and the continuation of symptoms for a period of several weeks after the drug is presumably eliminated from the body. It is considered that a high proportion of patients with symptoms of schizophrenia owe much of their symptomatology to cannabis use.

CONCLUSIONS

Although planned studies have failed to show that cannabis is responsible for psychological changes in long-term users, the samples used may be biased and other methodological problems may be present. The clinical examples presented support the idea of cannabis's causation of illness or modification of existing illness. These examples should promote reacceptance of the role of clinical observation in strengthening the validity of clinical theories. It is also hoped that the focus will shift from cannabis's role as a possible cause of psychiatric illness to a focus on the ways in which disturbances are caused and on how they may be modified by the drug's presence.

Knights, R.M., and Grenier, M.L. Problems in studying the effects of chronic cannabis use on intellectual abilities. Annals of the New York Academy of Sciences, 282:307-312, 1976.

DRUG	Cannabis
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Chronic, long-term users
AGE	Not specified
SEX	Not specified
ETHNICITY	Cross-cultural
GEOGRAPHICAL AREA	North America, Jamaica, South America, India, Greece
METHODOLOGY	Literature review; theoretical/critical review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	26

PURPOSE

The present paper reviews literature on the effects of long-term marijuana use on the cognitive functioning of humans. Studies of users in Jamaica, North and South America, India, and Greece are cited.

SUMMARY

Laboratory studies of regular users. These investigations usually find that acute cannabis intake impairs volunteers' abilities to perform tasks requiring complex attentional and short-term memory functions in a dose-related fashion. The degree of impairment appears to increase with task complexity and novelty.

Surveys of long-term users. The magnitude of the effects of cannabis use on intellectual skills has been dependent on the society surveyed. Those researching use in South American have concluded that cannabis contributes heavily to mental and physical deterioration. Reports from India conclude that moderate use of the drug does not injure the mind but that excessive use does. Surveys from North America have produced conflicting opinions.

Comparisons of heavy chronic users versus nonusers. A consistent problem in evaluating these studies has been the fact that subjects are often atypical or deviant groups or multiple drug users. Researchers who have employed more typical nonusers in experimental settings have found that infrequent users were impaired on the cognitive task after smoking 1 g of marijuana where frequent users were not.

Studies comparing the abilities of heavy chronic cannabis users with control groups of nonusers in their natural setting have been conducted in Greece and Jamaica. The study in Greece tested 40 users and 40 nonusers but found no significant differences in mood, thought, or behavior. One study in Jamaica compared subjects with at least 10 years of daily consumption of potent marijuana with a matched group of nonusers. No evidence of significant differences between the two groups was discovered from the numerous psychological tests.

A second study was conducted in Jamaica, where the estimated incidence of cannabis use for normal adult males is more than 50 percent and where one religious group has ritualized ganja smoking. The design included 30 ganja smokers and 30 nonsmokers matched for age, socioeconomic status, and residence. The mean age was 34 years, and the mean education level was third grade All volunteer subjects were admitted to the University Hospital for 6 days of interviews and psychological tests. Analysis of ganja supplied by the smokers showed that the mean percentage by weight of THC ranged from 0.7 to 10.3. Smokers were asked to abstain from ganja while in the hospital. After analyzing the data, investigators concluded that long-term cannabis use did not produce observable intellectual or specific ability deficits. Factors that may have influenced these findings are subject assessment by the Jamaican test administrator, the time of testing, potential tolerance effects, and subjects' ages.

CONCLUSIONS

Although there may be subtle deleterious effects associated with marijuana, long-term cannabis use does not appear to be associated with major impairment of intellectual function. Further research of the type reviewed will not be fruitful for the following reasons. Findings from foreign studies may not be relevant to North America. For example, fundamental differences exist between the potency of cannabis administered and the user populations in Jamaica and the United States. Personality factors also complicate interpretations of the effects of long-term cannabis use in North America. Because long-term users are generally classed as deviant and marijuana use is illegal, it is extremely difficult to find a sample of chronic users that represents the general population. A final problem facing researchers is the tendency for chronic marijuana users to use other drugs as well, particularly alcohol and tobacco.

One method of studying the effects of marijuana would be an examination of adolescent drug users as they progress through documented stages of drug use, beginning with legal drugs and beer or wine and progressing to marijuana. Other approaches to long-term effects that have not been exploited fully include animal studies exploring changes in behavior and problem-solving after long-term cannabis use, research into the association between marijuana use and causes of diseases and death, and investigation of marijuana's therapeutic effects for reducing seizures and migraine headaches.

Liakos, A.; Boulougouris, J.C.; and Stefanis, C. Psychophysiologic effects of acute cannabis smoking in long-term users. Annals of the New York Academy of Sciences, 282:375-386, 1976.

DRUG	Cannabis
SAMPLE SIZE	20
SAMPLE TYPE	Long-term users
AGE	Mature adults (mean: 43)
SEX	Male
ETHNICITY	Greek
GEOGRAPHICAL AREA	Greece
METHODOLOGY	Multivariate analysis; descriptive study
DATA COLLECTION INSTRUMENT	Physical examinations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	25

PURPOSE

The pulse rate is the most important psychophysiologic measure used in research on the effects of marijuana. Marijuana has been shown to produce an immediate pulse rate increase that is closely related to the dose of THC used. Studies also indicate that the pulse rate slows at a later stage and that marijuana users have slow pulse rates.

Conflicting results have been produced by other research focusing on such physiologic measures as body temperature, pupil size, respiration rate, blood flow, and galvanic skin response.

Most of the existing research has used subjects with limited-to-average experience with marijuana. This study used a sample of long-term users of cannabis to determine the acute effects of cannabis on experienced cannabis users who tolerate and consume large doses of the drug.

METHODOLOGY

The subjects were 20 Greek males, all of whom had used cannabis for at least 10 years. The subjects were all healthy. Their average age was 43 years, and they reported smoking an average of 5 grams of cannabis a day for an average of 25 years.

The study used a randomized block design and double-blind conditions. Subjects were given the following preparations: 2 g of marijuana with 2.6 percent THC content, 4 g of Greek hashish with 4 to 5 percent THC, 3 g of the same hashish, and 3 g of marijuana placebo. On the last day of the testing sequence, the subjects received 100 mg of pure THC injected into 3 g of a marijuana placebo. The materials were mixed with tobacco, as is customary for Greek users. They were rolled into large cigarettes and administered to each subject on 4 successive days.

Pulse rate, forearm blood flow, pupil size, galvanic skin response, respiration, and body temperature were measured before and after smoking. Stepwise linear regression was used to analyze the data.

RESULTS

Heart rate increased significantly after the administration of all four active preparations. In general, the increase was greatest 20 to 30 minutes after smoking. The average maximum heart rate increase was 38 beats per minute, which occurred 10 minutes after smoking the pure THC preparation. The administration of the placebo produced a maximum average increase of 17 beats per minute during the smoking period.

Blood flow decreased significantly 30 minutes after smoking the drug. The pupils were dilated significantly at both 30 minutes and 75 minutes after smoking for all the drug preparations except that consisting of 2 g hashish. Basal skin conductance decreased for the drugs as a group in comparison to the placebo. The subjects' temperatures and respiration rates did not exhibit any drug effects.

The pulse rate changes were similar to those found for lower doses in less experienced subjects, but the changes resulting from the hashish smoking were less than predicted based on THC content.

The tests also showed a small but significant dilation of pupil size, which persisted for 75 minutes after smoking.

CONCLUSIONS

Based on the pulse rate changes observed in this study, it appears that long-term users of cannabis tolerate large doses. The differing results for marijuana, pure THC, and hashish may have been caused by study conditions such as the difficulty of evenly distributing hashish in tobacco or the higher cannabinol and cannabidiol content of hashish in comparison to marijuana.

Mellinger, G.D.; Somers, R.H.; Davidson, S.T.; and Manheimer, D.I. The amotivational syndrome and the college student. Annals of the New York Academy of Sciences, 282:37-55, 1976.

DRUG	Marijuana; multidrug
SAMPLE SIZE	960
SAMPLE TYPE	College students
AGE	Young adults
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Berkeley, California
METHODOLOGY	Longitudinal survey (panel)
DATA COLLECTION INSTRUMENT	Interviews; questionnaires
DATE(S) CONDUCTED	Fall 1970; spring 1973
NO. OF REFERENCES	24

PURPOSE

The role of drug use in the amotivational syndrome affecting the academic progress of college students remains controversial. In an earlier study, the authors were able to establish that academic motivation, not drug use, was the crucial factor influencing students to drop out of college. That study left unanswered whether drug use precedes low motivation or vice versa and whether both dropping out and low motivation can be explained by sociocultural factors. The present study investigates the extent to which the relation of drug use (including marijuana use) to dropping out and to academic motivation can be explained by variables representing subcultural values in combination with family background factors. To this end, drug use in a normal population, consequences of the drug use in that population, and background differences between users and nonusers are explored.

METHODOLOGY

The sample consisted of 960 men entering the University of California at Berkeley as freshmen in fall 1970. Data were collected early in the subjects' freshman year, using personal interviews

and self-administered forms (with a 92 percent completion rate), and again in the spring of 1973, using self-administered questionnaires (with a completion rate of 87 percent of the original respondents). Drug use data were obtained from the self-administered questionnaires. Questions were phrased identically on both surveys, with some new questions added the second time. Drug classes examined were marijuana and/or hashish, psychedelics, cocaine, heroin, opium, other opiates, inhalants, amphetamines and other stimulants, and barbiturates and sedatives. Respondents were asked whether they had ever used any drug in each of the classes, how long they had used it, how long ago they had last used it, and how many days they had used it during the fall quarter.

RESULTS

Drug use. More than one-half of the respondents had used drugs before entering the university. Multiple-drug users tended to use marijuana more frequently, were more likely to have friends who used drugs, and were more likely to identify with drug users than were subjects who used only marijuana. Despite high prevalence of use, levels of use were generally experimental or recreational rather than habitual or compulsive, especially among men who used only marijuana. Few users could be regarded as heavy users over an extended period, but both continuity of use and multiple-drug use were strongly related to frequently of marijuana use. Thus, identifying continuing-frequent marijuana users eliminated casual users and established a group of users whose frequency of use was relatively high (61 percent had used marijuana once a week or more during the fall quarter). Isolating the continuing multiple drug users also identified men who tended to use both marijuana and other drugs relatively frequently (70 percent of this group used marijuana once a week or more during the fall quarter).

Drug use and dropping out. Dropout rates appeared higher among drug users, especially multiple drug users, than among nonusers, but differences between users and nonusers disappeared when conventional academic motivation and attainment of college degrees by parents were taken into account. Among freshmen whose academic motivation was high (62 percent of the sample) no relation was found between drug use recorded in 1970 and becoming a permanent dropout. Among freshmen whose academic motivation was low, no significant differences were found between nonusers and three of the four user groups. However, dropouts were high (53 percent) in the subgroup (19 subjects) of continuing multiple-drug users with low academic motivation and with parents who had not completed college.

Drug use and low academic motivation. Multiple regression analyses demonstrated that for most of the drug users in the sample the probability of dropping out was no higher and, in the case of continuing-frequent marijuana-only users, was somewhat lower than might be expected, given their background characteristics, value orientations, and academic motivation as freshmen. However, two exceptions to this generalization were found. The subgroup of 19 continuing multiple-drug users with less educated parents were more subject to high dropout rates than nonusers, and their higher dropout rate is not explained by the other predictors, including academic motivation, in the analysis. The other exception, although insignificant, is the subgroup of men who used marijuana frequently during the year before entering college and who escalated to multiple-drug use after entering college. Thus, the progression from frequent marijuana use in high school to multiple-drug use in college may increase the likelihood of dropping out.

CONCLUSIONS

Indirect effects of drug use on dropping out were negligible, although in two cases, a positive relation between drug use and dropping out was not entirely explained by the other predictors in the analysis. However, among men who had not used drugs other than marijuana and even among the majority of multiple-drug users, no evidence was found that drug use had any relation to dropping out that was independent of family background, relationships with parents in high school, and social values. For most users these factors, rather than drug use, accounted for dropping out of school. Furthermore, moderate drug use did not appear to produce serious amotivational problems. The findings also suggested that certain individuals are less able than others to cope with drug use and may thus be susceptible to drug-induced impairment of their capacity to deal realistically with life.

Mendelson, J.H.; Kuehnle, J.C.; Greenberg, I.; and Mello, N.K. The effects of marihuana use on human operant behavior: Individual data. In: Braude, M.C., and Szara, S., eds. The Pharmacology of Marihuana. Vol. 2. New York: Raven Press, 1976. Pp. 643-653.

DRUG	Marijuana
SAMPLE SIZE	27
SAMPLE TYPE	Casual and heavy users
AGE	Young adults (mean: 23; range: 21 to 26)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Belmont, Massachusetts
METHODOLOGY	Correlational study; comparative study
DATA COLLECTION INSTRUMENT	Operant task; observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	23

PURPOSE

Since more marijuana research has focused on acute effects of the drug, it is not known whether acute drug effects are similar to those experienced during chronic use. In addition, much controversy and confusion exist over the issue of the amotivational syndrome associated by some researchers with marijuana use.

This study examined the amotivational syndrome by focusing on marijuana's effects on operant behavior in both casual and heavy marijuana users. An objective measure was used to define the behavioral effects of marijuana.

METHODOLOGY

The subjects were 27 healthy male volunteers who were studied in groups of 3 and 4. The subjects included 12 casual users who had used marijuana for an average of 5.3 years and an average of 11.5 times per month and 15 heavy users who had used marijuana 43 times per month for an average of 5.6 years. The casual users ranged from 21 to 26 years old, with an average of 23.6 years, while the heavy users ranged from 21 to 25 and had an average age of 23.2 years.

Each subject had his own room on the research ward of the Alcohol and Drug Abuse Research Center at the McLean Hospital in Belmont, Massachusetts. The subjects had access to a common dayroom and a variety of recreational facilities. The study period included a baseline period of 5 days, a 21-day period during which subjects could acquire and smoke marijuana cigarettes, and a 5-day postsmoking period.

During the 21-day marijuana smoking phase, subjects could work on a simple operant task involving a button-pressing response to earn points that were exchangeable for either money or marijuana cigarettes. During the 5-day periods before and after the smoking phase, the subjects could work only for money. Subjects who worked at a steady rate could earn 1,800 points per half hour and could exchange these points for 50 cents or for a marijuana cigarette. Subjects had access to the experimental apparatus for all but about 2 hours per day. The subjects could see their total point accumulation at all times.

RESULTS

Both the heavy and casual users progressively increased their daily marijuana use over the 21-day period. The heavy users' consumption increased at a somewhat higher rate than that of the casual users. The casual users started at a rate of two cigarettes per day and increased their intake to three cigarettes a day, whereas the heavy users began smoking four cigarettes a day and increased to almost seven cigarettes a day. On the last day of marijuana availability, casual and heavy users smoked an average of 6 and 14 cigarettes, respectively.

For both heavy and casual users, operant work and marijuana use increased each day from 8 a.m. to 12 midnight and decreased thereafter. The casual users consistently worked between 5 and 11 hours per day, even though only 1 to 1.5 hours were required to earn the number of cigarettes smoked. The heavy users worked between 6.7 and 14.4 hours per day but did not change their work output over time.

THC's estimated half-life of 28 hours was used as the basis for an examination of operant performance during the 24-hour period following the evening hours, found to be the hours in which most of the smoking took place. Most of the casual users showed no systematic relationship between operant work and the number of marijuana cigarettes smoked during this time period. In contrast, heavy users tended to show a progressive and significant decrease in operant work as a function of increased marijuana consumption on the previous day. However, three heavy smokers showed little or no change in operant work as a function of the number of marijuana cigarettes smoked. Both the heavy and casual users left the study with about $345 each.

CONCLUSIONS

Heavy and casual marijuana users maintained relatively stable daily operant response rates at lower doses of marijuana. When operant work was analyzed as a function of the preceding day's marijuana dose, independent of time, a dose-related decrease in output occurred for heavy users. Heavy users generally maintained a higher sustained work level and smoking level than the casual users. Subjects worked while smoking. They generally worked most during peak smoking. The decrease in operant responding by heavy users was probably due to the absence of marijuana reinforcement rather than to a severe marijuana withdrawal syndrome.

A simplistic view of the amotivational effects of smoking marijuana is clearly untenable, given the higher amount of work performed by heavy users and the fact that both groups earned the same amount of money. The psychological and motivational changes in marijuana users reported by some are probably an acute transient effect that occurs only after heavy use. Thus, the data do not support the hypothesis that marijuana induces an amotivational syndrome.

Moskowitz, H. Marijuana and driving. Accident Analysis and Prevention, 8:21-26, 1976.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	45

PURPOSE

Research has documented that marijuana produces significant phenomenological, perceptual, cognitive, and psychomotor effects in users and that the majority of marijuana users have driven under the influence of the drug. The present study reviews epidemiological and experimental evidence regarding the effects of cannabis on driving safety.

SUMMARY

Estimates of marijuana's role in causing accidents could best be obtained by comparing cannabis levels in drivers involved in accidents with cannabis levels in drivers not involved in accidents, or by comparing accident rates of marijuana users with rates of nonusers. However, data of the appropriate kind are either not available or difficult to interpret. Thus, information on the accident-causing potential of marijuana must come from experimental studies of driving-related performance while under the influence of administered marijuana.

Findings indicate that marijuana use slightly impairs ocular control and, more significantly, decreases the performance of subjects on a tracking task. Studies of simple sensory functions

with anticipated stimuli that have low demands for information analysis demonstrate no performance decrement. Marijuana does not affect the visual brightness threshold, dark adaptation, visual acuity, or depth perception. However, considerable evidence points to performance decrement under the influence of marijuana when the subject is faced with stimuli that demand constant attention; that appear at random, unexpected intervals; or that require additional central processing such as storage and retrieval. Large performance decrements have been found for conditions that demand continuous attention and a stable perceptual framework (e.g., autokinesis, detection of intermittent random signals in either or both central and peripheral vision, and recognition of previously presented material). Impairment of vigilance as measured by detection of randomly presented signals appears to occur at a central point in the information processing system rather than in some stage of sensory transduction or transmission. Thus, evidence points to decrements in perceptual tasks and in sensory motor tasks that have important perceptual elements. An analysis of the proximal causes of drug-related accidents is required to determine the significance of decrements in attention, signal detection, and vigilance for driving performance.

Simulator studies examining the perceptual aspects of driving also show deficits in attention or perception but little impairment of tracking or car control. Actual driving performance tests suggest that marijuana significantly affects judgment, care, and concentration. On the whole, marijuana can impair aspects of tracking and can control components of driving under conditions demanding considerable maneuvering skill or involving demands on the perceptual functions.

On another level, monitoring the environment for potential dangers and signals is clearly impaired at fairly low marijuana levels and in situations that do not have extraordinary demands for information processing. Marijuana appears to affect patterns of observation so that subjects intoxicated by marijuana spend less time on each single fixation to extract the information in that visual glance; subjects eyes flit from one fixation to the next. Further data indicate that marijuana has a tranquilizing rather than a stimulating effect in many situations, thus affecting decisionmaking. Finally, studies of risk-taking behavior of subjects under the influence of marijuana demonstrate that marijuana produces decreased willingness to take risks. While decision time may be increased in nonemergency situations, no changes occur in decision time when an emergency decision is required.

CONCLUSIONS

Marijuana significantly impairs perceptual functions of importance for driving and can be expected to interfere with the ability of drivers to monitor the environment for important signals and potential dangers. To some extent tracking aspects of driving are also affected by the impairment of the perceptual functions necessary for their control. The motor aspect of tracking is less likely to be influenced, as motor performance per se appears less affected by marijuana. No evidence exists that emotional or attitudinal changes in subjects under marijuana influence would be likely to lead to increased risktaking in the driving situation.

Moskowitz, H.; Hulbert, S.; and McGlothlin, W.H. Marihuana: Effects on simulated driving performance. Accident Analysis and Prevention, 8:45-50, 1976.

DRUG	Marijuana
SAMPLE SIZE	23
SAMPLE TYPE	College students
AGE	Young adults (mean age: 24 years)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Observations
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	10

PURPOSE

Conflicting results were achieved in two previous studies of the effects of marijuana on simulated driving performance. One study showed that marijuana increased only errors in maintaining prescribed speeds, while the other showed that start and stop responses were impaired and that the impairment was dose dependent. The present study used a more complex simulator than was used in the previous studies to determine marijuana's effects on simulated driving performance.

METHODOLOGY

Subjects were 24 male college students who had used marijuana but were not currently using it more than 3 times per week. They had volunteered for a paid experiment without knowing that it involved drugs. Subjects' mean age was 24 years. Subjects were exposed to four dose levels (0, 50, 100, and 200 micrograms THC per kilogram body weight) and were tested in a complex driving simulator. The simulator used a car mounted on a chassis dynamometer facing a filmed scene showing a 160-degree view. Twenty-five performance measures were derived based on steering wheel usage, brake and accelerator pad usage, speed, and tracking. The simulator also used a visual search-and-recognition task based on random appearance of lights in the

periphery. Subjects took part in one training session and four experimental test sessions. Treatment sessions for an individual subject occurred at weekly intervals and at the same time of day. After smoking for 20 minutes, subjects entered the simulator. The experiment used a double-blind method regarding the doses of THC. Twenty-three of the subjects completed the experiment.

RESULTS

Marijuana increased subjects' pulse rates; the placebo also slightly increased the pulse rate. Data analysis showed that none of the car control-tracking scores was significantly changed in either mean or variance by the treatments. However, a clear and statistically significant decrease occurred in performance on the search-and-recognition task. Marijuana produced increased errors in recognition of traffic lights and delayed response times to them.

CONCLUSIONS

The experiment's results were consistent with those found in the two earlier studies of marijuana's effect on driving simulator performance. Results suggested that the main locus of marijuana impairment of driving performance was in the interference with perceptual processes involved in data acquisition necessary for safe control of the vehicle. Thus, the impairment is probably related to attention or perception and not to motor responsiveness. However, the negative findings regarding car handling or tracking do not eliminate this aspect as a possible driving hazard related to marijuana consumption, as an earlier study of alcohol also failed to show significant impairment on these measures. The findings of laboratory studies should be integrated with epidemiological investigations of the role of drugs in traffic accidents to permit firm conclusions regarding the effects of marijuana on driving safety. Practical methods for detecting marijuana's presence in body fluids will be required for this research.

Moskowitz, H.; Ziedman, K.; and Sharma, S. Visual search behavior while viewing driving scenes under the influence of alcohol and marihuana. Human Factors, 18(5):417-431, 1976.

DRUG	Alcohol, marijuana
SAMPLE SIZE	31
SAMPLE TYPE	Users
AGE	Alcohol: young adults; mature adults (mean: 30.6) Marijuana: young adults (mean: 23.8)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	California
METHODOLOGY	Multivariate analysis; correlational study
DATA COLLECTION INSTRUMENT	MMPI; interviews; Driving Simulator; other (see text)
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	22

PURPOSE

Perceptual error has often been the immediate cause of alcohol-related automobile accidents. Marijuana has also been reported to produce perceptual deficits in performance.

This study examined the eye movements of subjects under the influence of either alcohol or marijuana who were viewing a movie of driving scenes while sitting in a driving simulator. A computer data recording and analysis system permitted the rapid extraction of a wide variety of performance variables.

METHODOLOGY

The 21 male subjects for the alcohol experiments, averaging 30.6 years of age, with a range in age from 21 to 57 years, held current driving licenses. They were heavy alcohol users, as assessed by the Cahalan, Cisin, and Crossley drinking practice scale and the Oates-McCay drinking questionnaire. None had any medical problems or were attending alcohol treatment facilities.

The alcohol subjects were divided into three groups according to the blood alcohol concentration (BAC) produced by the treatment doses (i.e., 0.0 percent, 0.075 percent, and 0.15 percent).

The placebo group drank only orange juice with a teaspoon of vodka floated on top of each drink, and the others were given either high (1.37 grams alcohol per kilogram body weight) or low (0.735 grams alcohol) doses.

The 10 male subjects in the marijuana experiment averaged 23.8 years of age, with a range from 21 to 26 years, had used marijuana 10 times or more, and were currently using it 3 times weekly or less. The subjects had current drivers' licenses and were categorized as normal emotionally, based on the MMPI and a personal interview. Three marijuana doses were administered: 0, 50, and 200 mcg delta-9 THC per kilogram body weight.

After practice sessions, the alcohol and marijuana subjects sat in a driving simulator wearing a helmet and spectacle frames containing a device used to measure eye movements. The subjects viewed a 17-minute film showing moderate to heavy traffic density and a number of staged events. The subjects were also asked to perform subsidiary tasks, such as releasing a response switch when an event important for drivers to notice appeared on the screen. Alcohol subjects had to identify the direction of arrows superimposed on the traffic scene, and marijuana subjects were shown Landolt C-rings.

Information from both eye and head movement sensors was fed into a computer generating eye and head position coordinates and the resulting Eye Point of Regard (EPR) relative to the screen. The EPR signals were routed into a computer for on-line digitization and into two oscilloscopes to provide an X-Y display. Viewing time was analyzed in terms of the duration and frequency of dwells, pursuits, saccades, and blinks.

RESULTS

Alcohol produced significant changes in visual search behavior. Increased duration of dwells, reduced frequency of dwells, and increased duration and frequency of pursuits were all found. The dwell time was greater for looks at events requiring an explicit decision and response than for general events not requiring an explicit response. The analysis of responses to critical events indicated that subjects under the influence of alcohol did less examination of the internal details of the event and paid less attention to other events during this time than did other subjects.

None of the visual search or subsidiary tasks were affected to any degree by the marijuana treatment. Dwell and pursuit frequency, duration, and variability and the horizontal and vertical spatial distributions of dwells were not influenced by marijuana. The critical events and subsidiary tasks also showed no marijuana effect.

CONCLUSIONS

Alcohol and marijuana differ in their effects on objective measures of visual search behavior. While alcohol produced large decrements in these behaviors, the same measures were unaffected by marijuana. However, other studies have shown marijuana to strongly affect visual autokinesis, vigilance, and measures of concentrated attention in situations in which alcohol produced no impairments. They have also shown that marijuana-influenced subjects could track a stimulus but not report what they were seeing. This indicates that marijuana's impairment of visual performance does not occur at the central nervous levels that control the eye's ability to track environmental stimuli.

Rubin, V., and Comitas, L. Ganja in Jamaica: The Effects of Marijuana. New York: Anchor/ Doubleday, 1976.

DRUG	Marijuana
SAMPLE SIZE	60
SAMPLE TYPE	Smokers; nonsmokers
AGE	23 to 53 years
SEX	Male
ETHNICITY	Black
GEOGRAPHICAL AREA	Jamaica
METHODOLOGY	Cross-sectional
DATA COLLECTION INSTRUMENT	Medical tests; psychological tests; interviews
DATE(S) CONDUCTED	1970-1972
NO. OF REFERENCES	136

PURPOSE

The rural and urban working-class population of Jamaica has used marijuana (or "ganja") for generations. It forms an integral part of the Jamaican cultural tradition and value system, and its use is therefore subject to and conditioned by societal expectations and reactions quite different from those attached to it in American or European contexts.

This report presents the results of the Jamaica study, an investigation of cultural, physiological, and psychological parameters of cannabis use in Jamaica. It combines field research in the natural setting and detailed clinical examinations of long-term chronic cannabis users, providing a new perspective on the relationship between man and marijuana and examining current concerns about the effects of its use.

METHODOLOGY

The study was carried out by the Research Institute for the Study of Man in collaboration with the University of the West Indies, supported by the National Institute of Mental Health. Two distinct but integrated research thrusts were made. One was primarily social scientific and field

based, with ethnohistorical, anthropological, and sociological components. The other was clinical and hospital based, with medical, psychiatric, and psychological components; the research groups collaborated and reciprocally stimulated new investigative efforts.

The social science team conducted two phases of field investigation. The first, which took about 3 months in 1970, was a pilot study of the role of ganja in Jamaican ways of life. Anthropologists surveyed six localities--three in rural districts, two in southeastern parishes, and one in the slum area of Kingston. During the second phase, which began early in 1971 and lasted for a year, two anthropologists made separate studies of two communities, two others concentrated on one locality in separate studies, another collected life histories of the people selected for clinical study, and a sociologist carried out archival research on the history of ganja legislation in Jamaica.

Seven communities were finally selected for in-depth study for periods of about 6 months. Five of the communities are rural, one is quasi-urban, and the other is a lower class neighborhood that represents the Jamaican urban condition. A total of 60 adult working-class males, 30 ganja smokers and 30 nonsmokers, matched for age, socioeconomic status, and residence, were selected from 4 of the 7 communities for clinical tests on the effects of chronic smoking. All were admitted to the University Hospital for 6 consecutive days of examinations; detailed medical histories were taken, and examinations and tests included radiology of heart and lungs, electroencephalographs, respiratory function, hematologic and treponemal serology, and chromosome studies. Blood and urine samples were analyzed for peripheral thyroid hormone levels and seroid excretion. The battery of 19 psychological tests administered included 1 personality test, 3 tests of intellectual and verbal abilities, and 15 neuropsychological tests. Electroencephalograph studies included a substudy of sleep recordings.

RESULTS

Acute effects of ganja smoking in a natural setting. To test the widely held Jamaican belief that ganja use enhances physical energy and work productivity, subjects from a small agricultural community were interviewed, videotaped at work, and participated in numerous laboratory studies. Four case studies illustrate the findings that ganja smoking alters the rate and organization of movement and increases the expenditure of energy, that behavioral changes related to light or moderate smoking are not significant in agricultural work over extended periods, that behavioral changes related to have ganja smoking are significant in such work over extended time periods, and that both moderate and heavy smoking reinforces social cohesiveness during work in group situations.

Clinical studies. Excepting lowered bicarbonate levels after exercise, no major statistical differences between ganja smokers and nonsmokers were found with respect to pulmonary function, although differences existed between the two groups in blood hemoglobin and monocyte count values. In addition, no significant differences could be demonstrated in the incidence of mental illness or alcoholism; in abnormalities of mood, thought process, or behavior; on scales for extroversion and neuroticism; in the number of arrests or convictions for crimes; on movements in social and economic position; or in electroencephalograph abnormalities. Finally, the comparisons of psychological test results between the two groups indicate no consistent differences; long-term cannabis use by these men did not produce demonstrable intellectual or ability deficits when they were without the drug for 3 days or any evidence to suggest schizophrenia or permanent brain damage.

Attitides and reactions to ganja. The extensive life history and community study data strongly indicate that the use of ganja by lower class Jamaicans is a situational syndrome, that it is selectively taken for specific purposes. Reasons for use of ganja and reactions to the drug are situationally determined by perceived needs, whether for health, hunger/appetite, meditation, relaxation, or problemsolving. The major reason given for ganja use is the perceived stimulus to energy and work motivation; curative and prophylactic properties are also commonly accepted attributes of ganja. Moreover, most subjects, in viewing the relationship of ganja to crime, stressed the predisposition of the user rather than ganja as the causative factor in antisocial behavior. Results were not sufficiently clear to establish levels of dependency to the drug or to determine whether tolerance to the drug develops. Finally, some of the subjects reported vision episodes, more than half on their first ganja smoking experience. The phenomenon appears to represent a collective vision, or myth, related to initiation into the ganja subculture

and perhaps to origins of ganja use in Jamaica. No evidence was found to support the relationship of ganja to the amotivational syndrome or to link ganja use to psychoses.

CONCLUSIONS

Judging from the clinical data, the physical risk to the individual appears to relate primarily to smoking; the risk of chronic cannabis smoking may parallel the risks of chronic tobacco smoking. The psychiatric findings do not bear out any of the extreme allegations about the deleterious effects of chronic cannabis use on sanity, cerebral atrophy, brain damage, or personality deterioration. Further, no evidence exists of any causal relationship between cannabis use and violence or poverty or that cannabis use produces apathy and indolence. In fact, the ganja complex provides an adaptive mechanism by which many Jamaicans cope with limited life chances in a harsh environment.

Satz, P.; Fletcher, J.M.; and Sutker, L.S. Neuropsychologic, intellectual, and personality correlates of chronic marijuana use in native Costa Ricans. Annals of the New York Academy of Sciences, 282:266-306, 1976.

DRUG	Marijuana
SAMPLE SIZE	208
SAMPLE TYPE	Users versus nonusers
AGE	Adolescents; young adults; mature adults
SEX	Male
ETHNICITY	Costa Rican
GEOGRAPHICAL AREA	Costa Rica
METHODOLOGY	Survey--correlational, comparative
DATA COLLECTION INSTRUMENT	Neuropsychologic tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	61

PURPOSE

Despite more than four decades of marijuana research, considerable controversy still exists concerning the acute and/or chronic effects of this drug on human adaptive functions, particularly on cognition, attention, and personality. Both early and more recent studies of marijuana's effects on brain function and personality have methodological deficiencies, especially in sampling. The Jamaica Project, the best study to date on the effects of long-term marijuana use, could not identify any negative effects of long-term marijuana use, but the study was marred by the use of culturally biased instruments, a limited test battery, failure to use multivariate analysis, and lack of differentiation in dosages of chronic users. Because of the potential health and legal implications associated with marijuana use, the present study seeks to replicate the results of the Jamaica Project in Costa Rica. Special attention is focused on problems of cultural bias in the selection of an appropriate neuropsychologic and personality test battery. The study encompasses three phases: a preexperimental phase to select instruments, an experimental phase to test for marijuana's effects, and a postexperimental phase to differentiate effects further by frequency of use and types of users.

METHODOLOGY

Preexperimental phase. The sample consisted of 86 lower class Costa Rican males (mean age, 31.3; range, 16 to 64 years) applying for services with the Ministry of Health in San Jose. The 17 neuropyschological tests administered included 4 tests from the Williams Memory Scale (digit span, the Rey-Davis measure of nonverbal learning, word learning, and delayed recall), 7 tests from the Wechsler Memory Scale (personal information, orientation, mental control, logical memory, digit span, visual reproduction, and word associate learning), the Facial Recognition Memory Test, the Finger Oscillation Test, the Halstead Tactual Performance Test, the Finger Localization Test, the Benton Visual Retention Test, and the Institute of Personality and Ability Testing's (IPAT's) Culture Fair Intelligence Test (CFIT). The tests were individually administered by native Latin Americans.

Experimental phase. The sample encompassed 41 Costa Rican chronic marijuana users not included in the preexperimental group. All users had smoked at least one marijuana cigarette three times per week for at least 10 years. The control sample of 41 nonusers was matched for age, education, marital status, occupation, and tobacco and alcohol use. The test battery used in the preexperimental phase, together with the IPAT personality test 16 PF, form E, were administered individually by experienced native Latin Americans. The IPAT test was selected because it was sensitive to basic personality traits in the normal adult personality and because an existing Spanish language version of the test could be adapted to Costa Rican circumstances. Inclusion of this test facilitated comparison of the study group with the Jamaica Project sample. All data were subjected to a multivariate extension of the t-test (Hotelling's T^2), followed by separate univariate t-tests (for matched pairs) for each variable.

Postexperimental phase. Users were divided into a low-level group (less than 7 cigarettes daily) with 20 subjects and a high-level group (more than 20 cigarettes daily) with 20 subjects. Users were also classified by lifestyle as "street movers," who used marijuana in mobile, social situations as a means of escaping responsibilities (18 subjects) or stable users, with conventional family and job patterns (23 subjects). Both sets of groups were compared with their matched controls and with each other.

RESULTS

Findings regarding the preexperimental phase indicate that the neuropsychologic tests were appropriate for use in Costa Rica, although the orientation and personal information tests proved too easy, and two sets of tests (visual reproduction-Benton Visual Retention and associate learning-word learning) were somewhat redundant. (All but the logical memory test of the Wechsler Scale were thus discarded.) The CFIT proved too difficult and was replaced with the Wechsler Adult Intelligence Test administered according to the Satz-Mogel Short-Form Procedure. The latter test had been standardized to a Spanish-speaking culture and did not yield misleading scores.

For the experimental phase, no significant differences were observed between performances of users and nonusers on neuropsychologic tests. Users did, however, exhibit a nonsignificant trend to do more poorly than nonusers on 11 of the 16 test variables when only univariate analysis was used. Intelligence test performances for the two groups were also very similar, although the user group had a higher, but not significantly higher, performance on 6 of 11 subtests and a slightly higher verbal and full-scale Intelligence Quotient (IQ). Finally, the personality profile of the 2 groups was similar for 16 primary and 8 secondary personality factors. Only the factor "conservatism-liberalism" was significant in univariate testing, and the multivariate test showed no significant differences.

Regarding the postexperimental phase, no significant differences were found between high users and low users on any of the tests. Comparisons of low users and controls showed a trend for users to perform better on verbal tests and for controls to do better on performance (object assembly) tests. Low users also proved more extreme than nonusers on the conservatism-radicalism personality dimension.

No significant differences were noted between street movers and their controls. However, stable users, in comparison with their matched controls, were more venturesome, suspicious, radical, and conscientious. Several interesting differences were revealed between stable users and street movers. According to univariate analysis, stable users were slower than street movers

on the tactual performance tasks, made more errors on finger localization, were slower on picture completion, and had a slower performance IQ. Street movers were reportedly more venturesome than stable users. However, no significant multivariate differences were apparent between the two groups.

CONCLUSIONS

This study confirms the findings of the Jamaica Project and other controlled studies that chronic marijuana use does not do irreversible damage to the brain or personality. No abnormal or deviant personality traits were apparent at either high or low levels of use. The results do not, however, imply that marijuana use is an insignificant social or personal event with no influence on individual behavior. Users and nonusers display personality differences, presumably as a function of attitudes and concerns about marijuana use. Thus, stable users are more venturesome, liberal, and suspicious and have more superego strength than their nonuser counterparts. The patterns of marijuana use may be related to early formative childrearing practices in some of the users. However, the personality differences among subgroups of chronic users probably existed before marijuana use began.

Soueif, M.I. Some determinants of psychological deficits associated with chronic cannabis consumption. Bulletin on Narcotics, 28(1):25-42, 1976.

DRUG	Cannabis
SAMPLE SIZE	1,689
SAMPLE TYPE	Users versus nonusers
AGE	15 to 50 years
SEX	Male
ETHNICITY	Egyptian
GEOGRAPHICAL AREA	Egypt
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Psychomotor and cognitive tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	31

PURPOSE

The association between cannabis use and function deficits as related to age, literacy, and urban or rural residence is explored. The general hypothesis tested states that the lower the nondrug level of proficiency on tests of cognitive and psychomotor performance the smaller the size of the function deficit associated with drug taking. The predictions formulated held that performance on psychomotor and cognitive tests is correlated with subjects' literacy level, with subjects' urbanism, and, inversely, with subjects' age. Further, the lower the literacy level, the nearer to ruralism, and the older the subject, the smaller the amount of function impairment associated with cannabis consumption.

METHODOLOGY

The experimental group consisted of 850 male chronic cannabis users ranging in age from 15 to 50. All were inmates in Egyptian prisons for cannabis possession. The 460 inmates in urban prisons had lived at least part of their lives in cities; 390 subjects detained in rural prisons were largely residents of small towns. Further, 60 percent of the subjects were illiterate, while

only 6 percent had completed high school. The majority of the group members were either skilled laborers or shopkeepers.

The control sample group of 839 Egyptian nonusers were males ranging in age from 15 to 50. Of the nonusers, 454 were from urban prisons and the rest from rural prisons; however, fewer of the controls than the users had grown up in urban settings. The percentage of illiterates was 54.8, and levels of schooling for the remainder ranged up to the university level. The majority of the subjects were skilled or unskilled laborers.

A total of 12 objective tests generating 16 test variables were administered to the subjects; t-tests were used for analysis.

RESULTS

Findings confirmed the major hypothesis. While differences were apparent between users' and nonusers' test scores at the highest levels of literacy, no function deficits were correlated with cannabis consumption in the illiterate groups. Urban dwellers tended to earn high scores and rural dwellers low scores. As proposed, differences in test scores of users and nonusers were less significant for rural groups. Control subjects under 25 years old earned better scores than control subjects over 35 years old on all variables tested; no comparison was made within the user group because of insurmountable difficulties in finding groups that differed in age but not in duration of cannabis consumption. However, findings revealed a definite trend toward less significant differences in test scores between users and nonusers in the older groups than in the younger groups.

CONCLUSIONS

Functional impairment from marijuana use is less marked in rural, illiterate, older subjects than in relatively young city-bred subjects with some education. Cross-validating studies are needed to define the limits of this formula for other populations. Nevertheless, the hypothesis can explain apparently conflicting findings of other studies. Thus, different types of subjects will produce different results, depending on the sophistication and age of the subjects. For example, early reports that cannabis use had no ill effects may have been based on observations of the rural illiterate population, which used the drug most frequently yet was least likely to show impairment.

Stanton, M.D.; Mintz, J.; and Franklin, R.M. Drug flashbacks. II. Some additional findings. The International Journal of the Addictions, 11(1):53-69, 1976.

DRUG	Marijuana; LSD; STP
SAMPLE SIZE	315
SAMPLE TYPE	Army personnel
AGE	Not specified
SEX	Not specified
ETHNICITY	Not specified
GEOGRAPHICAL AREA	South Vietnam
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Not specified
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	21

PURPOSE

As the consequences of questions raised in a previous study, the authors seek to investigate the relationship between flashbacks attributed to marijuana and the extent of marijuana and/or LSD/STP use. Further areas of interest are the possibility of exploring this relationship using data from individuals who use only marijuana or from subjects who use only marijuana and LSD/STP and the correlations between flashbacks and use levels for the various drugs.

METHODOLOGY

The methodology for data gathering and the characteristics of the overall sample, which encompassed 2,001 Army personnel entering and leaving South Vietnam, have been described elsewhere and are not discussed in this paper. The subgroups analyzed here included 241 respondents who reported LSD/STP use, 12 respondents who reported having flashbacks they attributed to marijuana, 31 habitual marijuana smokers who reported no other drug use, and 31 respondents who used both marijuana and LSD/STP but no other drugs. Some subjects belonged to more than one subgroup. Respondents reported the extent to which they had used a particular drug

and their drug use while in Vietnam and before coming to Vietnam. Data analysis was performed on a joint score for both periods of use.

RESULTS

Of the 12 subjects reporting flashbacks attributed to marijuana, 5 were habitual marijuana smokers (i.e., 200 or more times). Three of the five habitual users reported LSD/STP use, and four had used at least three other drugs. Three of the nonhabitual and one of the habitual users used marijuana exclusively. Only 1 of 31 habitual users of marijuana alone reported a flashback, suggesting that habitual marijuana use is not correlated to flashbacks. Furthermore, only 3 of the 31 subjects who used only marijuana and LSD/STP had experienced flashbacks. None of the three was a heavy user, and all of them attributed the flashbacks to LSD/STP. However, LSD/ STP users who reported flashbacks used significantly more marijuana than those who did not. No such significant differences were noted for other drugs. For the 241 respondents who used LSD/STP a significant correlation of use among all the drugs surveyed except marijuana and heroin and marijuana and LSD/STP was found. However, the correlation between marijuana and LSD/STP use before Vietnam was greater than in Vietnam. The correlation between extent of LSD/STP use and occurrence of acid flashbacks was not significant, while the correlation between marijuana use and acid flashbacks was significant. Marijuana use was not only the best but the only significant predictor of acid flashbacks. Finally, the correlation of marijuana use with LSD/STP flashbacks did not differ for high and low LSD/STP users.

CONCLUSIONS

LSD/STP use does not facilitate flashbacks attributed to marijuana, nor do marijuana flashbacks appear to be related to heavy marijuana use. Moreover, heavy LSD/STP users are no more likely than light users to experience flashbacks. However, acid flashbacks are correlated both to marijuana use and to the extent of marijuana use. Thus, marijuana use may catalyze the LSD/STP experience physiologically or psychologically to trigger a flashback to a previous LSD/STP experience; alternatively, the occurrence of the LSD/STP flashback may lead to increased marijuana use as a means of avoiding LSD/STP flashbacks.

Stefanis, C.; Liakos, A.; and Boulougouris, J.C. Incidence of mental illness in hashish users and controls. Annals of the New York Academy of Sciences, 282:58-63, 1976.

DRUG	Cannabis
SAMPLE SIZE	87
SAMPLE TYPE	Users versus nonusers
AGE	Mature adults
SEX	Male
ETHNICITY	Greek
GEOGRAPHICAL AREA	Greece
METHODOLOGY	Survey--comparative
DATA COLLECTION INSTRUMENT	Interviews; psychiatric examinations; psychiatric records; public records
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	13

PURPOSE

Whether chronic cannabis use affects mental health is a controversial issue. It is known that under certain conditions an acute transitory psychotic state may occur immediately after use, but the question of more lasting effects on mental health is still unresolved. Early reports from Eastern countries of an association between cannabis use and mental disorders are interesting but biased, and few methodologically sound studies have appeared. The present study investigates the mental state of chronic cannabis users in Greece under controlled conditions.

METHODOLOGY

The study sample consisted of 47 paid male volunteers without incapacitating illnesses. Subjects were under 58 years of age and used no other addictive drugs or alcohol in excess. Subjects reported an average of 23 years of cannabis use, with a smoking frequency of three times a day (i.e., a daily average of 5 g of hashish). The control sample contained 40 males under age 58 who had never used cannabis or other drugs but had smoked tobacco. Matching was not performed on an individual basis. Instead, controls were selected from the same residential areas as users and had the same socioeconomic background. Factors considered were age, family

origin, education, residence at birth, and upbringing. All subjects were descendents of refugees from Asia Minor and belonged to low socioeconomic classes.

Assessment of subjects' mental health was made by three psychiatrists on the basis of information obtained from structured social histories, semistructured psychiatric examinations performed according to the Mayer-Gross, Slater, and Roth format; data gathered from home visits; reports of local civil authorities; and psychiatric histories of subjects with previous treatment histories. The diagnostic criteria of the American Psychiatric Association were used for the diagnostic evaluation of this information.

RESULTS

Users differed significantly from controls only in previous psychiatric illness, imprisonment records, regular military service, and work records. Significantly more users were diagnosed as suffering from psychiatric abnormalities (38 percent) than controls (17 percent). Twenty-five percent of the users were diagnosed as having personality disorders, compared to 7 percent of the controls. Five users (and no controls) exhibited pronounced antisocial maladjustive behavior typical of antisocial personality disorders. The differences in the incidence of other types of psychiatric abnormalities, neuroses, depression, and paranoid schizophrenia were not significant.

Two of three users diagnosed as paranoid schizophrenic psychotics had positive family histories of mental disorder; all three had started using cannabis early in their teens. No significant relationship was found betwen consumption rate and incidence of psychiatric abnormality, employment, or imprisonment. In fact, more psychiatrically abnormal users were found among moderate users (43 percent) than among heavy users (21 percent). The only apparent differences between mentally ill and normal users were in prison sentences for reasons other than cannabis use; more psychiatrically abnormal users (83 percent) than normal users (48 percent) received such sentences.

CONCLUSIONS

Psychopathology is more frequent in the population of chronic hashish users than in nonusers. The difference is due mainly to personality disorders, especially those of the antisocial type. However, it is unlikely that cannabis use is responsible for the psychiatric abnormalities. Instead, cannabis use may be another form of antisocial behavior more likely to occur in people with personality disorders.

Tinklenberg, J.R.; Roth, W.T.; Kopell, B.S.; and Murphy, P. Cannabis and alcohol effects on assaultiveness in adolescent delinquents. Annals of the New York Academy of Sciences, 282:85-94, 1976.

DRUG	Marijuana; alcohol
SAMPLE SIZE	248
SAMPLE TYPE	Incarcerated delinquents
AGE	13 to 21 years (median age: 17.1 years)
SEX	Male
ETHNICITY	Cross-cultural
GEOGRAPHICAL AREA	California
METHODOLOGY	Survey--correlational and comparative
DATA COLLECTION INSTRUMENT	Interviews; official records
DATE(S) CONDUCTED	1973-1975
NO. OF REFERENCES	13

PURPOSE

The increases of both cannabis use and assaultive crimes over the last 10 years have raised the question of a possible causal link between the two phenomena. Examination of drug use patterns among delinquents incarcerated in a California Youth Authority facility shows that these youths have extensively used cannabis, alcohol, and many other psychoactive substances. Thus, any specific relationships between drugs and aggressive behavior or other aberrant behavior might be discernible in this population. This study examined the effects of cannabis and alcohol on assaultiveness in adolescent delinquents. It focused on three questions: (1) Compared to alcohol, how often was cannabis actually involved in fights, driving accidents, problems with family or friends, and other difficulties? (2) How did the study's subjects perceive cannabis and alcohol in terms of changing assaultive tendencies? (3) Was cannabis deliberately used to enhance or to suppress aggressive behavior?

METHODOLOGY

The sample consisted of 248 male adolescents imprisoned during the period June 1973 to July 1975 at moderate-security Northern California Youth Authority facilities. Subjects included physically

assaultive delinquents, sex offenders, and delinquents incarcerated for other crimes. The groups were combined into a single sample when preliminary analyses showed no marked differences related to the issues involved in the study. Subjects ranged from 13 to 21 years old, with a median age of 17.1 years. The sample was 37 percent black, 34 percent white, 28 percent Mexican-American, and 2 percent other. Most subjects were from lower socioeconomic backgrounds. Data sources were a semistructured, private interview conducted by either an experienced psychiatrist or a professional interviewer and analyses of official records, including police records and laboratory reports. If the two data sources disagreed, the data for that subject were not used. Interviews were conducted at least 6 months after arrest, and participation was voluntary.

RESULTS

Subjects used cannabis and alcohol at about the same frequency; thus, alcohol and cannabis had equal potentials for involvement in the subjects' behavior. Alcohol was more often linked with five types of behavioral problems: medical complications, substantial troubles with friends or families, trouble at school or work, automobile accidents or arrests or arrests for intoxicated driving, and arrests for public intoxication or disorderly conduct. Subjects perceived alcohol as likely to increase their chance of fighting, while cannabis reportedly had no effect or reduced the likelihood of such behavior. Self-perceptions of drug effects and assaultiveness were consistent with subjects' actual behavior. Of 220 respondents, 59 percent reported 1 or more fights while under the influence of alcohol, while 25 percent reported 1 or more fights under the influence of cannabis. Of 229 multiple drug users, 39 percent identified secobarbital as the single drug most likely to enhance assaultiveness, and 28 percent chose alcohol. Neither cannabis nor any other single drug was chosen by more than 5 percent of the remaining subjects. Instead, cannabis was cited by 49 percent of the respondents as the single drug most likely to reduce assaultiveness, while no other drug having this effect was chosen by more than 7 percent of the remaining subjects. When asked if they had ever deliberately used a drug to bolster courage, 84 subjects answered in the affirmative. Of these, 42 percent used alcohol, 20 percent used secobarbital, and 16 percent used cannabis. In contrast, 24 subjects had used cannabis to keep calm and to stay out of trouble, and 4 had used alcohol for the same purpose. When subjects were asked about drug involvement in fights during the past year, they reported that 29 percent of the fights involved only alcohol, while 2 percent involved only cannabis.

CONCLUSIONS

Results showed that, in comparison with alcohol, cannabis was underrepresented in a variety of behavioral problems. Cannabis was not reported to have the socially disruptive effects of alcohol, although both drugs were used with about the same frequency by the study subjects. Cannabis was generally described as reducing assaultiveness, while alcohol either had little effect or increased assaultiveness. Cannabis was used more often for tranquilizing purposes, while alcohol was used more often to bolster courage. Findings are consistent with those of a prior drug-crime study and with other field studies that indicate that cannabis is seldom associated with the augmentation of human aggression. Despite the limitations of experimental laboratory studies of human behavior, many of the laboratory findings are consistent with results of field research.

Hall, F.B.; Klein, A.L.; and Waters, J.E. Long term effects of marijuana smoking. Journal of Altered States of Consciousness, 2(2):161-170, 1975-76.

DRUG	Marijuana
SAMPLE SIZE	40
SAMPLE TYPE	Users and nonusers
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--comparative
DATA COLLECTION INSTRUMENT	Questionnaires; intellectual functioning and motor skills tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	27

PURPOSE

Marijuana use has increased dramatically in the United States in the last 5 years, but relatively little research has focused on its long-term effects. Some studies have indicated that two possible effects of marijuana on mental functioning are certain kinds of mental illness and the amotivational syndrome. The present study examined some long-term effects of intermittent to moderate marijuana smoking on intellectual functioning and perceptual-motor skills.

METHODOLOGY

The study hypothesizes that there are no long-term effects of the use of marijuana in terms of attention, muscular coordination, and memory, and that long-term use of marijuana produces a significant effect on motivation. Subjects were selected among 250 college students who completed a survey questionnaire. Forth students who met the specific requirements of the experimental group and the control group were asked to take part in the study. The experimental group consisted of 10 male and 10 female students who had smoked marijuana for at least 1 year. These students had smoked marijuana an average of six or more times per month. The only other drug used was alcohol, except for caffeine and prescription drugs. The control group consisted

of 10 male and 10 female students who were nonusers of marijuana and who had drunk alcohol for at least 2 years. Group members had similar grades, ages, and socioeconomic backgrounds.

Tests used for intellectual functioning were the Digit Symbol Substitution Test, the Motivation Analysis Test (MAT), and the Goal Directed Serial Alternation. The tests used for the perceptual-motor skills were the Pursuit Rotor Test and the Complex Hand-Eye Reaction Time Test. Analysis of variance and t-tests were used to analyze the data.

RESULTS

The analysis of variance showed a nonsignificant difference between the experimental and control groups on the Pursuit Rotor Task. A significant difference occurred between the speeds, as expected, with less total time accumulated for higher speeds. None of the t-tests showed differences at the .05 level of significance between the two groups. No significant difference was found between the groups on the MAT.

CONCLUSIONS

No significant differences were found between marijuana smokers and nonsmokers in their performance on the tests administered. The groups also did not differ in terms of motivation, as indicated by the MAT results. This finding may have been caused by the close matching of the subjects on intellectual capacities and by the lack of confounding of other variables. Results may have also been influenced by the relatively short period of marijuana usage, the use of college students who were "test anxious," and the use of an objective test rather than clinical observation.

Results support the apparent conclusion that in terms of intellectual functions such as cognition, motivation, memory, and in terms of perceptual-motor skills such as motor coordination, sustained attention, and reaction time, long-term use of marijuana produces insignificant effects. These results apply only, however, to intermittent to moderate use of marijuana over 2- to 3-year periods. More decisive research on the possible factors affecting the results is needed.

Babor, T.F.; Mendelson, J.H.; Greenberg, I.; and Kuehnle, J.C. Marijuana consumption and tolerance to physiological and subjective effects. Archives of General Psychiatry, 32:1548-1552, 1975.

DRUG	Marijuana
SAMPLE SIZE	18
SAMPLE TYPE	Moderate and heavy marijuana users
AGE	Young adults (range: 21-26)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Belmont, Massachusetts
METHODOLOGY	Correlational study
DATA COLLECTION INSTRUMENT	Standing pulse rate determination; self-reports of intoxication levels
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	17

PURPOSE

Studies of chronic marijuana users have noted a tendency for consumption to increase after continued usage, attributing this phenomenon to the development of tolerance. Tolerance to the drug's disruptive behavioral and psychological effects would allow experienced users to function normally after heavy consumption, whereas tolerance to the subjective effect--the psychological high described by users--would increase the need for additional consumption to achieve previous levels of intoxication.

Numerous studies have shown that experimental subjects with a prior history of heavy marijuana consumption perform better than subjects with little or no drug experience. However, researchers have not discovered any conclusive relationships between tolerance to marijuana's effects and changes in heart rate and subjective intoxication, although the existing evidence is suggestive. To provide more empirical data in this area, this research monitored changes in pulse rate and subjective intoxication of moderate and heavy users allowed free access to marijuana.

METHODOLOGY

The project conducted seven identical studies, each involving a four-person group homogeneous in terms of marijuana usage. Each study consisted of three phases: a 5-day predrug baseline period, 21 days when marijuana could be purchased and smoked on a free-choice basis, and a 5-day postdrug period. Subjects were able to work at simple operative tasks to earn points that could either be exchanged for money to buy marijuana or kept. Participation was voluntary, and subjects could withdraw at any time.

The investigation took place at the Alcohol and Drug Abuse Research Center at McLean Hospital in Belmont, Massachusetts. Of the 27 persons who completed the research, only 18 were included in the analysis. Subjects were healthy adult males between 21 and 26 years old who were recruited through advertisements and differed significantly only in their prior marijuana consumption.

Cigarettes used in the study contained approximately 1 g of marijuana with a THC content of 1.8 to 2.3 percent. Moderate users generally consumed more than 92 percent of each cigarette, while heavy users consumed more than 96 percent. Standing pulse rate was determined immediately before, immediately after, and 25 minutes after smoking. Mood reports completed by subjects immediately before and 25 minutes after smoking served as intoxication ratings. The data were evaluated with a 7-point bipolar adjective scale labeled "stoned" versus "straight." To ensure reliability, heavy users also completed an 11-point scale to rate their intoxication level, ranging from "not high at all" to "highest ever."

RESULTS

Both groups tended to increase consumption during the study period, although this pattern was more pronounced among heavy users. Heavy users averaged 5.7 cigarettes per day. Their pulse rates increased sharply to an average reading of 135 beats per minute following the first marijuana cigarette smoked but remained relatively constant at 106 beats per minute thereafter. At 25 minutes, however, the pulse rate diminished with continued smoking.

Moderate users averaged 3.2 cigarettes per day. Their average pulse rate was elevated immediately after and 25 minutes after smoking, but there was no tendency for either reading to diminish during the study period. Heavy users reported a progressive decline in subjective intoxication levels, but no such trend occurred among moderate users.

CONCLUSIONS

Tolerance does not appear to develop unless heavy doses of THC are administered repeatedly. Moreover, the tendency to increase consumption over a period of time is not necessarily associated with the development of tolerance.

Heavy users' pulse rates indicate that they may have developed tolerance to the duration but not to the intensity of the physiological effect. It was impossible to determine if heavy users' tolerance to the subjective effect was a function of diminished intensity or reduced duration. It appears that when tolerance develops to one effect, it also develops to the other (e.g., heavy users' results); conversely, when tolerance to one reaction is absent, it is absent in the other (moderate users' results). The subjective impact could also be influenced by the accumulation of THC as marijuana cigarettes are smoked closely together or by psychosocial factors associated with repeated smoking.

In a followup questionnaire, subjects cited boredom, availability, and help in tolerating ward routine as reasons for smoking more than they initially expected. These responses suggest that social influence and social reinforcement are important determinants of increased marijuana consumption.

Kandel, D., and Faust, R. Sequence and stages in patterns of adolescent drug use. Archives of General Psychiatry, 32(7):923-932, 1975.

DRUG	Marijuana; alcohol; other legal and illegal drugs
SAMPLE SIZE	Time 1--8,206; time 2--7,250; time 3--1,635
SAMPLE TYPE	High school students; graduated seniors
AGE	Adolescents
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	New York State
METHODOLOGY	Longitudinal survey; correlational study; multivariate analysis
DATA COLLECTION INSTRUMENT	Questionnaire
DATE(S) CONDUCTED	Fall 1971, spring 1972, fall-winter 1972
NO. OF REFERENCES	30

PURPOSE

Researchers have documented a strong association between the use of marijuana and the eventual use of more serious drugs. However, this association does not prove any causal connection nor does it imply that all individuals using marijuana will necessarily progress to heroin use. An earlier study by the authors, based on a large sample of New York State adolescents, confirmed the interrelationship in the use of various substances and established definite patterns of adolescent drug use. This project, probably the first prospective longitudinal survey of normal youths, collected data on drug use from the New York State sample over the course of 1 academic year and again from the senior class after graduation.

METHODOLOGY

A representative sample of adolescents from 18 New York State public secondary schools was contacted in the fall of 1971 (T1) and again in the spring of 1972 (T2) at an interval of 5 to 6 months. Structured, self-administered questionnaires were given simultaneously in a classroom situation in these schools. The survey obtained usable questionnaires from 8,206 adolescents, a response rate of 81 percent, and from 7,250 students, a response rate of 76 percent, in the fall and spring, respectively. Graduated seniors from each school were surveyed by questionnaire

and telephone 5 to 9 months after the second survey (T3), and responses were obtained from 1,635, or 69 percent.

To ensure confidentiality, self-generated identification codes were used to link the records between waves. Matching students to themselves produced a panel sample of 5,468 students for T1-T2 and 985 respondents for the T2-T3 panel sample. Because of deficiencies inherent in a self-generated matching method, the T1-T2 panel sample was weighted.

The questionnaires asked at each of the three time periods how many times the adolescents had ever used or had used in the preceding 30 days each of 11 classes of substances, including marijuana; hashish; LSD; other psychedelics; methamphetamines; other amphetamines; tranquilizers; cocaine; heroin; other opiates; and inhalants. Questions were also asked about the use of hard liquor, beer or wine, and tobacco. Data on drug use patterns were arranged in a seven-category Guttman scale; 97 percent of the sample fell into one of the seven legal Guttman types at any time period.

RESULTS

The sample population tended overwhelmingly to maintain the same cumulative pattern of use in subsequent intervals as in the initial interviews, possibly because of the short interval involved. With the exception of legal drug users, the higher the initial level of the drug used initially, the less stable the subsequent pattern. As defined by the Guttman scale, most changes in each of the time intervals involved adjacent categories. Progression followed a sequence from nonuse to the use of legal drugs, cannabis, pills, psychedelics, cocaine, and finally to heroin. Regression followed the same sequence in reverse. Students with high initial patterns of use were more likely to exhibit changes of more than one step on this scale.

The data indicate that legal drug use is a necessary stage between nonuse and illegal drug use. Of the students sampled in the fall of 1971, 36 percent progressed to legal drugs, and 1 percent progressed to legal drugs and cannabis; by contrast, only 1 percent of the nonusers went directly to illicit drugs without first using a legal substance. Trends in regression are similar, with illegal drug users passing through lower categories of illegal drugs to legal drugs on their way to nonuse. Sequences involving adolescents who were using drugs at the initial survey indicated that marijuana is a crucial step in the induction into illicit drugs. Only 2 or 3 percent of legal drug users used illicit drugs without also trying marijuana. In the followup studies, most legal drug users who had progressed limited themselves to marijuana, but 26 percent did progress to another illicit drug, usually to pills. Subjective reports by the students collected in the spring of 1972 confirmed the drug use sequence, except that use of cocaine and heroin were reversed.

Sequences of change and stability were examined in detail for substances classified as legal drugs--beer or wine, cigarettes, and hard liquor. The greater the number of legal drugs, the lower the proportion of youths who reverted to nonuse in the followup surveys. Among the students who were current users of legal drugs, none regressed to nonuse. The results also showed that beer and wine were clearly the entry drugs into the continuum of drug use. Among the legal drug users, however, hard liquor or tobacco rather than beer or wine preceded subsequent involvement in illicit drugs. Youths who used all three substances were most likely to progress to illicit drugs.

Progression along the continuum of use was also affected by the intensity of initial use. Progression to a higher ranked substance was positively related to intensity of current use, and the movement from legal to illicit drugs was especially strong among adolescents who were heavy users of both hard liquor and cigarettes. Between fall and spring, the majority of heavy marijuana users had progressed to other illicit drugs.

CONCLUSIONS

The same sequences in patterns of drug use and change were found in a sample broken down by year in school and among youths differing in sex, family educational background, and race. Thus, this model provides a comprehensive and dynamic view of stages of involvement in drug use. The four major phases are: (1) beer or wine, (2) hard liquor or tobacco, (3) cannabis,

and (4) other illicit drugs. Very few youths progress to other illicit drugs without prior experience with marijuana. However, the data do not prove that the use of a particular drug infallibly leads to the use of other drugs or that the drugs themselves contain pharmacological properties that encourage progression from one to another. Future studies should make comparisons between users and nonusers of the restricted group of respondents who have already used the drug at the preceding stage.

McGlothlin, W.H. Sociocultural factors in marihuana use in the United States. In: Rubin, V., ed. Cannabis and Culture. The Hague: Mouton, 1975. Pp. 531-547.

DRUG	Marijuana
SAMPLE SIZE	Not specified
SAMPLE TYPE	General population
AGE	Adolescents; young adults
SEX	Not specified
ETHNICITY	White; black
GEOGRAPHICAL AREA	United States
METHODOLOGY	Theoretical/critical review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	51

PURPOSE

The paper traces the expansion of marjuana use from its lower class origins through the hippie movement of the sixties to its acceptance by middle and upper class youths and identifies current patterns of marijuana use.

SUMMARY

The origin of the middle class drug epidemic of the 1960s actually dates back to the mid-fifties, when the emphasis was on LSD and not marijuana. Most of the early hallucinogen users were professionals well beyond the age of later typical drug users. They were motivated by reports that LSD enhanced self-understanding or that other beneficial experiences could result. LSD was particularly attractive because it was legal for laboratory experimental purposes and did not carry the stigma of illicit drugs such as marijuana. By 1964, clandestine LSD manufacture was becoming more common and increasingly sophisticated, although persons involved in these activities continued to be ideologically identified with the emerging drug culture and not motivated solely by financial considerations. By 1967, the LSD trip was serving as the unifying principle for hippie communities. As the hippie movement grew, the stage was set for radical modification

of beliefs and values on a mass scale. Marijuana was also adopted by the hippie subculture, but for the most part was little more than a social mood modifier that provided a mild passive reaction more in accord with the hippie philosophy than the effects of alcohol.

A number of factors contributed to the hippie movement and to middle class drug use; among these were alienation, weakening of family and community groups, chronic social and technological change, a lack of historical relatedness, and disillusionment with the Vietnam war. Social conditions also permitted options that did not previously exist. The affluence of society allowed prolonged periods of economic dependence and leisure, increasing the likelihood for radical departures from the existing norms.

The lower socioeconomic and minority groups were not responsive to a movement advocating dropping out of a materialistic society, so the hippie population of the 1960s was almost completely white and middle class. Similarly, the drug orientation of the counterculture continued to have a greater impact on middle class whites than on the lower socioeconomic groups. Marijuana use remains concentrated among youths in the same age group as those who participated actively in the hippie movement and who were most susceptible to the mass adoption of fads and styles. Furthermore, the prevalence of marijuana use is distinctly higher on the west coast, where the hippie movement had its origin and achieved its greatest influence. The symbolic role of marijuana use for expressing rebellion and protest has been documented. A number of studies also suggest that those individuals who become frequent marijuana users tend to be the least accepting of the beliefs, values, and behaviors of the dominant culture and most reponsive to the alternative positions advocated by the counterculture.

The patterns of current marijuana use reflect the symbolic or fad-type motivation for use. Recent surveys of marijuana use in the United States have found that while over 20 million individuals have tried the drug, only a small percentage use it on a daily or more frequent basis. In contrast, cultures with long histories of cannabis use appear to have a ratio of daily to occasional users that is substantially higher than that for the current population of American marijuana users. Furthermore, the typical amount of marijuana consumed per occasion per day by current users in the United States is quite small in comparison to that for other cultures. Recent surveys have also shown that the increase in the prevalence of marijuana use has slowed. Data on the duration of use after initiation remain contradictory. In other cultures, initiation into cannabis use is most common in adolescence and may be discontinued in adulthood. However, where it is culturally accepted, marijuana use appears to have a longevity comparable to that for alcohol use in this country.

CONCLUSIONS

The initiation of marijuana use by middle class youths is interpreted as marginal participation in the styles and protests of the hippie movement and is not related to the earlier use among lower socioeconomic minority groups. This explanation is supported by the chronology of events, the characteristics of the using population, and the pattern of marijuana use. However, the symbolic role of marijuana cannot sustain its use indefinitely; its use will either decline as it goes out of style or the motivation for use will shift to the drug's pharmacological properties. In terms of future use, the widespread use of marijuana in younger age groups and the positive reinforcement from the drug's effects will probably result in substantial continued use of small amounts on a casual basis for recreational purposes. Further, a small proportion of those continuing to use the substance will consume quantities comparable to the heavy usage observed in other cultures.

Meyer, R.E. Psychiatric consequences of marijuana use: The state of the evidence. In: Tinklenberg, J.R., ed. Marijuana and Health Hazards: Methodologic Issues in Current Research. New York: Academic Press, 1975. Pp. 133-152.

DRUG	Marijuana
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not applicable
NO. OF REFERENCES	77

PURPOSE

Scientific advances have not resolved many aspects of the marijuana controversy. The literature on the effects of marijuana use is a crazy quilt of clinical descriptions occasionally backed by the implications of laboratory investigation. One particularly perplexing aspect of the marijuana controversy concerns the psychiatric consequences of different degrees of marijuana use. There is little agreement on syndrome definitions, and the issues of cause and effect are difficult to separate from mere association. The present study reviews the literature on acute adverse psychological reactions, psychotic reactions, and nonpsychotic prolonged adverse reactions to marijuana use.

SUMMARY

Acute adverse reactions. Findings to date suggest that the vast majority of all acute adverse reactions to marijuana are panic reactions in which the users interpret the physical or psychological effects of the drug to mean that they are dying or losing their minds. Anxiety-inducing factors relating to sex, setting, and/or personality are generally responsible for acute panic reactions. The frequency rate of such panic states appears to be fairly high, but further

investigation of this area is required. Although flashback reactions have been reported, their frequency has not been established. As with acute adverse reactions, the flashback risk cannot be defined without further research.

Psychotic reactions. Marijuana can precipitate schizophrenic syndromes in vulnerable individuals. The question is whether the pathological premorbid personalities of psychotic users or the toxic effects of the drug itself are responsible for triggering acute schizophrenic reactions during marijuana intoxication. More sophisticated reporting of clinical cases and studies comparing the premorbid histories of psychotic users, nonpsychotic users, and psychotic nonusers could possibly resolve this issue. Eastern literature reports the occurrence of a specific marijuana psychosis, which may or may not be longlasting. The problem of relating marijuana psychosis to Western countries involves differences in smoking patterns in the East and West, the difficulty of translating the psychiatric symptom picture from one body of literature and culture to another, and the impossibility of generalizing from cases that are deserving of psychiatric attention to the marijuana-user population.

Nonpsychotic prolonged adverse reactions. The psychological dependence associated with marijuana consumption does not appear to be based upon primary reinforcing properties but rather on some complex interaction between social and psychological variables on the one hand and subjective variables on the other. The situation is more similar to hallucinogenic drug use than to the use of opiates and barbiturates. If lack of motivation is a function of daily intoxication, then it should be possible to eradicate the amotivational syndrome by ceasing daily use. At present, the patterns of marijuana use and dosage that have evolved in the United States are not marked by compulsive smoking behavior and/or abstinence distress. On this basis a syndrome of drug-focused motivation cannot be assumed.

The effects of marijuana intoxication on work performance remain unclear. Some experiments have shown that study subjects can maintain a high work output while experiencing the maximum effects of smoking marijuana. Others have found that the operant work output of casual marijuana users decreases with increasing marijuana consumption, while heavy users maintain a stable work output. Drug-induced impairment in the performance of certain tasks (involving complex reaction time and short-term memory) is likely, but these specific deficits in work performance are not related to motivation.

Changes in lifestyle have been attributed to specific pharmacological effects of marijuana. Oral doses of marijuana produce a greater concentration on the present and a shortening of the span of awareness into the future. Acute marijuana intoxication is associated with a passive attitude, but the relationship between this passive attitude and an evolving lifestyle remains controversial. Studies of the effects of marijuana use on psychosocial adaptation suggest that no general relationship exists between the degree of marijuana involvement and emergence of poor adaptation, and that idiosyncratic factors are therefore responsible when marijuana use is associated with psychosocial disorders.

Marijuana use in the United States has been linked, at least in heavy users, to the use of other drugs. While no evidence exists to support a hypothesis of progression from heavy marijuana use to heroin use, polydrug use is strongly correlated with frequency and intensity of marijuana use. This correlation may be partially explained by the general tendency toward psychoactive drug use and by the inclination of the most psychologically disturbed individuals to use widely accepted substances most intensively.

CONCLUSIONS

While data are not definitive, they suggest that marijuana use is more likely to be one aspect of social change rather than the responsible agent. Persistent case reports indicating the clinical risk of marijuana use must be placed in a broader perspective by conducting detailed followup studies that use psychiatric interviews and assessments of medical status and social performance. Clinical case reports may provide questions for investigation, but epidemiological and laboratory investigations are necessary to clarify cause-and-effect relationships in marijuana use.

Soueif, M.I. Chronic cannabis takers: Some temperamental characteristics. Drug and Alcohol Dependence, 1(2):125-154, 1975.

DRUG	Cannabis
SAMPLE SIZE	1,689
SAMPLE TYPE	Prisoners
AGE	15 to 50 years
SEX	Male
ETHNICITY	Egyptian
GEOGRAPHICAL AREA	Egypt
METHODOLOGY	Survey--correlational, comparative
DATA COLLECTION INSTRUMENT	Structured interviews
DATE(S) CONDUCTED	June 1967-March 1968
NO. OF REFERENCES	18

PURPOSE

Study of chronic cannabis consumption in Egypt has been underway at the National Centre for Social and Criminological Research since November 1957. Based on data from that project, the present article provides information on the temperamental characteristics of chronic cannabis users (i.e., personality traits, reactions to specific situations, assessment of desirable characteristics in same-sex acquaintances, and family background).

METHODOLOGY

The experimental sample consisted of 850 prison inmates convicted of cannabis use and detained in Egyptian prisons from June 1967 to March 1968. Subjects were largely illiterate, male, and aged 15 to 50 years (average age: 39). Most were married and had been married only once, and all had used cannabis at least once a month for the year preceding imprisonment. The sample of 839 controls derived from the same prisons as the experimental sample. All were males ranging in age from 15 to 50 (average age: 33.1), and the majority were illiterate. Most were married and reported fewer divorces than the experimental group. All subjects were interviewed according to a standard interview schedule.

RESULTS

Of the subjects who used cannabis once a day or less (354), 54.4 percent described themselves as docile, 17.6 percent as tending toward ascendancy, and 28 percent as in between. The corresponding percentages for nonusers were 64.1, 13.5, and 22.4. Users proved to be significantly more hesitant or cautious than nonusers. Concerning sociability, equal proportions of users and nonusers preferred to stay in the company of others, but more controls than users chose to be alone and fewer controls than users did not care whether they were alone or with people. Thus, for nonusers, the impact of others is greater than for users, suggesting that nonusers tend more toward conformity than users in opinions relevant to drug-taking behavior. Furthermore, the groups did not differ on acquiescence, but fewer users than controls tended to be negative toward the opinions of others. No appreciable differences were noted between the groups for emotional lability.

Users did not differ from nonusers with regard to quarrels with wives, friends, and colleagues, and they had fewer confrontations than nonusers with superiors and junior colleagues. However, users reported a higher frequency of discord than nonusers in interaction with their own children. Users appeared to be as successful as nonusers in avoiding provocation of their fathers and superiors, but if the tactics did not work, users reacted more aggressively than nonusers. Further, users did not differ from nonusers in the basic dimensions "farsightedness versus shortsightedness" and "social responsibility" as measured by ways of spending money earned unexpectedly. Similarly, no significant differences were apparent in work situations in which keeping promises was involved. Users were more likely than nonusers to cheat on work assignments and to blame others for their mistakes but were also more likely to help friends in trouble. Finally, cannabis users did not appear to be more open to temptation than controls.

Users and nonusers agreed in devaluing impulsiveness and negativism as desirable characteristics in male friends. However, they diverged significantly in their assessment of ascendancy-submissiveness; 20.8 percent of the controls versus 15.3 percent of the users preferred ascendancy. This suggested that the subjects adopted a compensatory rather than an assertive attitude toward friends' personality traits.

In contrast to American studies, no association could be established between loss of either parent and cannabis use. More users than controls reported marital discord between parents and the presence of stepparents in childhood years. More users than controls maintained that their fathers were permissive.

CONCLUSIONS

A number of the findings substantiate results of other investigators. Users appear to be socially perceptive and sensitive to the needs and feelings of others yet indifferent to the actual presence of others. In work situations, users display egocentric values emphasizing hedonism and little concern for others. However, users and nonusers exhibit no differences in acquiescence. Although it is tempting to use these points of agreement as the basis for a universal personality profile of cannabis users, major differences are apparent between cannabis use patterns in various cultures. For that reason, well-designed cross-cultural research is urgently needed to permit identification and verification of true universal characteristics.

Tinklenberg, J.R., and Darley, C.F. Psychological and cognitive effects of cannabis. In: Connell, P.H., and Dorn, N., eds. Cannabis and Man. New York: Churchill Livingstone, 1975. Pp. 45-65.

DRUG	Cannabis
SAMPLE SIZE	Not applicable
SAMPLE TYPE	Not applicable
AGE	Not applicable
SEX	Not applicable
ETHNICITY	Not applicable
GEOGRAPHICAL AREA	Not applicable
METHODOLOGY	Literature review
DATA COLLECTION INSTRUMENT	Not applicable
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	74

PURPOSE

Although descriptions of the psychological effects of cannabis date back to ancient times, recent applications of sophisticated experimental methods, especially the precise qualification of delta-9-tetrahydrocannabinols, have increased understanding of the drug's psychological and cognitive effects. The present conference paper provides an overview of the state of knowledge about effects of the drug, describes this information in terms of a conceptual model, and suggests directions for future cannabis research.

SUMMARY

Recent experiments have demonstrated that when reliable quantities of smoked cannabis or tetrahydrocannabinol are delivered to subjects, reproducible dose-dependent and time-action effects occur with many psychological and cognitive tasks. Not only dose but route of administration influences the effects. The individual's previous pattern of cannbis use is another important variable that affects drug effects; with repetitive use, tolerance to certain behavioral effects appears to develop. The immediate subjective and behavioral effects of cannabis, particularly at low doses, are significantly influenced by attitudes and the individual user and are derived

from mood, personality, and past drug experiences, as well as from the physical and social environment in which drug use takes place. However, little is known about the effects of repetitive, long-term cannabis consumption.

Effects vary considerably among individuals but usually involve initial euphoria, hilarity, mild restlessness, exhilaration, and later a state of relaxation. Some users, particularly neophytes, experience negative feelings such as anxiety or dysphoria. Subjective time is accelerated so that geophysical time seems to pass slowly. Perceptual experience arising from stimulation of sensory receptors also seems altered during cannabis intoxication. However, no firm evidence exists of actual changes in peripheral sensory thresholds or real enhancement of perceptual acuity. Other subjective changes include identification of new meanings in commonplace events, intuitive thinking, replacement of abstract symbols with visual imagery, an altered sense of self-identity and feelings of improved insight (at high doses), introspection and social withdrawal, synesthesia, and dream-like fantasies and hallucinations.

Subjective reports by cannabis users indicate that many feel as if their ability to drive vehicles or to perform other complex motor tasks is reduced but that they are usually able to compensate for any impairment. Laboratory studies have confirmed that performances on a wide range of psychomotor tasks are impaired during cannabis intoxication.

One of the most commonly reported effects of cannabis intoxication is difficulty in performing tasks in which information recently stored in memory must be accurately retrieved. However, cannabis does not impair the delayed free recall of information that has been stored in the long-term memory in a noncannabis state. Information presented in the drug state is more efficiently recalled during intoxication than during nonintoxication, but information initially stored during nondrug conditions is recalled equally well in either a drug or nondrug state. However, the influence of cannabis on retrieval processes seems to vary according to the type of memory task. The deficits in immediate recall are attributed to interference with information transference from short-term to long-term memory; without such transference stimuli are lost. Since transfer to long-term memory storage is controlled by active processes such as rehearsal (i.e., rote repetition), a likely explanation for the cannabis effect on memory storage is that drug subjects engage in less rehearsal and other control processes, perhaps due to external and/or internal distractions. An alternative explanation is that once rehearsal of an item is terminated, cannabis causes information that would be transferred to long-term storage to be lost from short-term storage more quickly.

The model proposed holds that cannabis causes more codes than usual to be entered into short-term memory storage. If more codes are activated for a particular stimulus, more codes for related items will also be activated and enter short-term memory storage. Such a model is consistent with the experimentally observed increase in intrusion errors (i.e., erroneously recalled information) during cannabis intoxication and with short-term memory deficits, which may indicate the inability of short-term memory storage to process the volume of information and to focus on relevant items. Furthermore, the greater number of items impinging on short-term storage per unit of geophysical time would explain the reported time-slowing effects of cannabis. The increased flow to short-term storage of usually inaccessible codes for a stimulus and related items might also subjectively enhance the richness and uniqueness of sensory events. Having available to consciousness a wider range of properties for any particular concept might also induce the feelings of increased insight and creativity that occur during cannabis intoxication. In psychomotor tasks, such as simple choice or reaction time, the repetitive nature of the task may allow intoxicated subjects to restrict the flow of irrelevant information into short-term storage during most of the trials of the task, with performance dropping significantly only on those trials where the restrictions are loosened.

Future research may delineate effects of cannabis on the processes that control and direct subjects' behavior and that may be ultimately responsible for the varied psychological and cognitive effects induced by the drug. Other studies might be devoted to interactions or cross-tolerances of cannabis with other drugs and to pharmacological differences among various batches of cannabis. A final area to be considered involves comparing the psychological and cognitive effects of cannabis with other psychoactive agents and hormones to determine the physiological mechanisms that subserve behavioral effects.

CONCLUSIONS

Cannabis does not markedly alter the earliest sensory-perceptual phases of information processing but does change individuals' subjective appreciation of many sensory perceptual experiences. Furthermore, cannabis markedly modifies many components of time sense, inducing enhanced subjective tempo so that the duration of events seems to be longer than usual. While cannabis does not significantly impair the retrieval of information from long-term memory storage, it does interfere with the initial storage of information in long-term storage and may alter the manner in which encoded information is entered into short-term storage. According to the proposed model, cannabis causes a flood of items to enter into short-term storage for every stimulus item, resulting in the various psychological effects observed. Integrating the psychological and cognitive effects of cannabis with the underlying alterations in physiological processes remains one of the ultimate goals of future cannabis research.

Weckowicz, T.E.; Fedora, O.; Mason, J.; Radstaak, D.; Bay, K.S.; and Yonge, K.A. Effect of marijuana on divergent and convergent production cognitive tests. Journal of Abnormal Psychology, 84(4):386-398, 1975.

DRUG	Marijuana
SAMPLE SIZE	84
SAMPLE TYPE	College staff; students
AGE	21 to 32 years (mean age: 24.05 years)
SEX	Male
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental
DATA COLLECTION INSTRUMENT	Psychological and intelligence tests
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	69

PURPOSE

Studies have indicated that acute cannabis intoxication produces an impairment of several simple and complex cognitive tasks. However, it is likely that the drug does not impair all of the cognitive functions to the same degree or act as a depressant in all cases. The present study seeks to investigate the effects of cannabis on the performance of divergent and convergent production tests and other cognitive tests. The hypotheses to be tested hold that marijuana, particularly at low doses, impairs performance on convergent production cognitive tests but fails to impair or even improves performance on divergent production cognitive tests; that marijuana affects performance on tests relating to the dominant and nondominant hemisphere differently and that marijuana, even at low doses, interferes with short-term memory storage.

METHODOLOGY

The sample consisted of 84 young male university staff members, as well as graduate and undergraduate students. The mean age was 24.05 years and the mean number of years of education was 15.4. Only subjects with no history of systemic or psychiatric disease and who had some previous exposure to cannabis were included. Subjects were then assigned at random to four

groups: high-dose marijuana, low-dose marijuana, placebo, and control groups. Each group had 21 subjects.

The experiment was conducted in a pleasantly furnished room with subdued lighting and soft rock music. The cannabis was administered in two doses: the initial dose of 286 mg was followed 70 minutes later by a booster dose of 143 mg. The plant material was prepared so that subjects in the high-dose group received 4 mg of delta-9-tetrahydrocannabinol (THC) initially, boosted by 2 mg THC 70 minutes later. The subjects in the low-dose group received 2 mg THC followed by 1 mg of THC 70 minutes later. In the initial and booster doses, the placebo group received THC-free plant material. The control group received no medication. The marijuana was smoked in a water pipe using a standardized procedure. The initial-dose smoking session lasted about 6 minutes and the booster-dose session about 3 minutes. The testing started 10 minutes after each smoking session. A double-blind procedure was used.

In the preexperimental testing session the following tests were administered in random order: the Wonderlic Intelligence Test (level 2, form A), the Quick Word Test (level 2, form A), the Wechsler-Bellevue Intelligence Scale (form 2, Similarities, Vocabulary, Block Design, Object Assembly), and the Reitan Finger Tapping Speed Test. During the experimental drug sessions a series of tests designed by Guilford (1967) and Guilford and Hoepfner (1971) was administered: New Users, a convergent production of semantic transformations test; Internally Consistent Figures, a convergent production of figural transformations test; Letter Number, a convergent production of symbolic relations test; Consequences, a divergent production of semantic units and divergent production of semantic transformations test; Sketches, a divergent production of figural units test; and Word Fluency, a divergent production of figural units test. Also administered were the Wechsler Adult Intelligence Scale (WAIS)--the Reitan Finger Tapping Test, Oral Word Fluency, Memory for Designs Test, Rate of Neckar Cube Reversals, Head-Size Judgment Test, and ratings of "high." Test scores were subjected to multivariate and univariate analysis of variance, as well as orthogonal comparisons.

RESULTS

The groups did not differ in performance on the seven tests administered during the preexperimental session. The differences between the means on the ratings of feeling high for the three experimental groups were highly significant. The drug impaired performance on three tests (Letter-Number, WAIS Vocabulary, WAIS Block Design) but improved performance on one test (Oral Word Fluency). The low-dose subjects performed significantly better than the high-dose subjects or showed a trend in this direction on five tests (New Uses, Internally Consistent Figures, Consequences, Word Fluency, WAIS Vocabulary). There was no placebo effect. Further, marijuana subjects made more errors than nonmarijuana subjects on the Memory for Designs Test; the difference between high- and low-dose groups was not significant. Reproduction of nonverbal visual material was impaired even at the 3 mg THC dose level. No differences among the groups in finger tapping speeds for either hand were observed.

CONCLUSIONS

While the hypothesized differences in performance of marijuana subjects on the divergent and convergent production test cannot be absolutely confirmed, there is a slight trend in this direction. The possibility exists that low doses of cannabis may improve performance on some cognitive tests. Cannabis may differentially affect performance on tests relating to the nondominant and dominant hemispheres, but these effects vary according to marijuana dose. For example, the WAIS subtest performance, which measures a mental ability related to the dominant hemisphere, is influenced by the high dose but not the low dose of marijuana. Even in small doses cannabis negatively influences memory for nonverbal visual material, but finger tapping speeds are not affected. The importance of using a wide range of doses and cognitive tests in future studies is emphasized.

Brill, N.Q., and Christie, R.L. Marihuana use and psychosocial adaptation: Follow-up study of a collegiate population. Archives of General Psychiatry, 31(5):713-719, 1974.

DRUG	Marijuana
SAMPLE SIZE	2,034
SAMPLE TYPE	College students
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Los Angeles, California
METHODOLOGY	Survey--longitudinal (cohort)
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	1971; 1972
NO. OF REFERENCES	13

PURPOSE

The possible association of long-term, regular use of marijuana with an "amotivational syndrome" has been widely discussed. The authors' studies of college students in 1970 showed significant psychosocial differences between marijuana users and nonusers but did not affirm the syndrome. The present study is a followup of the original college sample. Its goal was to determine the effects of long-term marijuana use on psychosocial adaptation.

METHODOLOGY

The original sample of 2,190 students was a 10 percent representative sample of the entire University of California-Los Angeles undergraduate population. Detailed data were obtained from 1,380 (63 percent) of these students. In 1971, followup data were obtained from 1,133 students, and in 1972, from 901. Data were obtained by mailed questionnaires, which consisted of questions about changes in adaptation and about subjective evaluations of the impact of marijuana use on student adaptation. A student who used marijuana less than 10 times was considered a nonuser, unless the use had recently begun. Occasional users were those using marijuana less than two times per week; frequent users were those using marijuana two to four times per week;

and regular users were those using marijuana five or more times per week. Students were compared according to their frequency of use and their pattern of increasing, stable, or decreasing frequency of use.

RESULTS

The percentage of students who had used marijuana increased to 61.6 percent of respondents in 1971 and 65.7 percent in 1972; current users constituted 52.1 percent of the 1971 sample and 51.4 percent of the 1972 sample. Some individuals began or increased their use of marijuana, while an equal number decreased use or quit. The average age of discontinuers was 23.6 years; discontinuers had a later age at which use began than did those only reducing use, whose average age was 23.3 years.

The great majority of students who had used marijuana reported no effect on adjustment or improved adjustment during the past year. Beneficial effects of adjustment were reported more frequently than harmful effects in six areas: college, recreational, social, marital, sexual, and emotional. However, 12.3 percent experienced worsened academic performance; 6.2 percent, worsened financial adjustment; and 8.6 percent, worsened physical health. In each of these three areas the percentage of students reporting negative effects was greater than the percentage claiming beneficial effects. Many but not all of those who reported negative effects reduced or quit their use of the drug. Most of those who reported that their adjustment was much worse in one or more areas as a result of marijuana use stated that they had quit using the drug; this group totaled 2 percent of the users. However, some quitters and declining users also reported that marijuana had favorable effects in every area of adaptation. An average of only 14 percent of decreasing users stated that marijuana had worsened their adaptation across 10 adjustment areas, while under 10 percent of stable and increasing users reported the same finding.

No significant difference in grade-point average or educational achievement was found between users and nonusers. Marijuana users experienced somewhat more difficulty in deciding on career goals and left college to reassess their goals slightly more often than did nonusers. In addition, the probability of having been arrested increased with the duration and frequency of marijuana use. Beneficial effects of marijuana use on sexual adjustment were reported more often than harmful effects; most marijuana-using subjects reported either no effect or improvement in this area. Marijuana users reported beneficial effects on marital adjustment more often than did nonusers, but differences between users and nonusers were insignificant. A total of 96 percent of nonusers reported either no change or improvement in their emotional state from 1971 to 1972, while 10 percent of the marijuana users reported a worsening of their emotional state. Higher proportions of current and past users than of nonusers had sought help for emotional difficulties in the past year.

CONCLUSIONS

Overall, findings suggest that marijuana's psychosocial effects are helpful for some, harmful for a few, and without substantial lasting effect for many. The effects seem to vary from individual to individual. Individual students tended to report similar effects for all areas of adjustment. Results also suggest that factors such as allergies or other idiosyncratic reactions are involved when an association between marijuana use and psychosocial disorder is found. Students in the present study appeared to be using marijuana as a social lubricant just as previous generations used alcohol.

Cunningham, W.H.; Cunningham, I.C.M.; and English, W.D. Sociopsychological characteristics of undergraduate marijuana users. The Journal of Genetic Psychology, 125:3-12, 1974.

DRUG	Marijuana
SAMPLE SIZE	547
SAMPLE TYPE	Undergraduate college students
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Austin, Texas
METHODOLOGY	Survey--comparative
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	16

PURPOSE

Little empirical research has focused on the sociopsychological characteristics of the marijuana user. The 1 published study in this area found, on the basis of an examination of 148 university students, that marijuana users were more socially skilled, more adventuresome, more concerned with others' feelings, more impulsive, more nonconforming, and broader in interests than were nonusers. However, the authors stated that their study was limited in time, place, and scope. The present study aimed to extend this research by examining 8 sociopsychological variables, 10 demographic variables, and 4 behavioral variables. Scores on these measures were used to determine whether undergraduate marijuana users could be successfully differentiated from classmates who did not use marijuana.

METHODOLOGY

Subjects were 547 undergraduates of the University of Texas at Austin. They were drawn from nine classes believed to be representative of the university's undergraduates. The anonymous questionnaires covered frequency of marijuana use, political conservatism, cosmopolitanism, political incapability and discontentment, dogmatism, concern with status, social responsibility, and

fundamentalism. Demographic variables included year in school, religion, sex, marital status, parents' occupations, parents' incomes, mothers' employment status, and the price of the parents' home. Subjects were also asked about their use of amphetamines, barbiturates, hallucinogens, heroin, and cocaine.

A univariate F test and linear discriminant analysis were used to determine which significant differences existed between users and nonusers of marijuana. Contingency tables classifying marijuana usage against the demographic and behavioral variables were tested by chi-square analysis. The sample included 28 daily users, 44 weekly users, 62 monthly users, 67 infrequent users, 102 who had tried marijuana at least once, and 244 persons who had never tried marijuana. The subjects in the last two categories were grouped together and termed nonusers.

RESULTS

The marijuana users were significantly less conservative, more cosmopolitan, more politically discontent, less dogmatic, less status conscious, less socially responsible, and less fundamental than were the nonusers. The discriminant analysis correctly classified 65 percent of the subjects. Univariate F tests and the Wilks Lambda test indicated that users and nonusers could be differentiated on the basis of their scores on the set of sociopsychological variables. Marijuana use was associated with higher social class, higher prices of family homes, less outside employment of mothers, and stronger religious orientation. Moreover, marijuana use was strongly related to the use of amphetamines, barbiturates, hallucinogens, and heroin/cocaine. For example, only 9 of the 104 people who had tried amphetamines had not smoked marijuana, while almost half of those who had tried amphetamines smoked marijuana daily or weekly.

CONCLUSIONS

Two patterns emerged from the results of the sociopsychological tests. First, marijuana smokers are more dissatisfied, disillusioned, and alienated than are nonsmokers. These qualities results from users being more politically discontent, less status conscious, less socially responsible, and less fundamental than nonusers. The second pattern is that marijuana smokers are more open to new ideas and fresh perspectives than are nonusers because users are less dogmatic, less conservative, and more cosmopolitan than nonusers. Results also showed that marijuana smokers tend to come from "good" environments in terms of family status and income. These families may provide funds, a sense of confidence, or a sense of flexibility, any of which may promote marijuana use. Additionally, a positive relationship was found between marijuana use and use of other drugs. Although this does not imply causality, it seems reasonable to assume that people who have tried marijuana are more likely to experiment with stronger drugs than are those who have not tried marijuana.

Fisher, G. Harmful effects of marihuana use: Experiences and opinions of current and past marihuana users. British Journal of Addiction, 69:75-84, 1974.

DRUG	Marijuana
SAMPLE SIZE	530
SAMPLE TYPE	Past users versus current users
AGE	16 to 66 years
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Mostly southern California
METHODOLOGY	Exploratory/descriptive survey
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	2

PURPOSE

The segment of society that does not use marijuana has said much about the dangers of marijuana use, but marijuana users have said little on this issue. Users more commonly note the benefits of marijuana use. This paper uses data from a larger study and reports marijuana users' views on experienced and perceived dangers of marijuana use to themselves and others.

METHODOLOGY

Subjects consisted of 530 marijuana users obtained from social network sampling and random sampling using voter registration lists. Most were located in southern California. Users were classified according to 5 use patterns: trial users (47), who had used marijuana only 1 to 3 times; past users (79), who had used marijuana in the past but not currently; occasional users (147), whose current use was less than once per week; regular users (200), who used marijuana 1 to 6 days a week; and daily users (57). About three-fifths of the sample members were males; the age range was 16 to 66 years, but most were aged 21 to 30. Subjects completed a 13-page questionnaire. They reported on eight areas related to the dangers of marijuana use: experienced harmful effects, potential dangers to self, type of harm caused to others, potential

dangers to society, reasons for possibly discontinuing use by current users, reasons for having discontinued use by past users, legal dangers, and types of people users would not recommend use marijuana.

RESULTS

A total of 13.9 percent of the 489 respondents answering the question regarding experienced harmful effects felt that their use of marijuana had harmed them in some way. Frequency of marijuana use was unrelated to the percentage of subjects reporting harm. Types of harm reported included interference in ability to function effectively, difficulty in integrating marijuana experiences into everyday living, greater awareness of personality and emotional problems without solution to these insights, and association with undesirable types of people. A total of 94.3 percent of occasional users, 82.4 percent of regular users, and 81.8 percent of daily users felt unharmed by marijuana use. A total of 21.9 percent of 494 responding subjects felt that marijuana had potential dangers for themselves. Such dangers included legal problems, behavioral dysfunction in society, reduction of effective personality functioning, psychological addiction, and possibility of leading to more dangerous drug-taking behavior. Almost one-third of the respondents knew of others who had been harmed by the use of marijuana. Types of harm included interference with effective functioning, mental disturbances, addictive qualities, legal difficulties, use of other drugs, and physical harm. Over one-third of those responding saw some potential dangers to society from the use of marijuana. However, as use of marijuana increased, the belief that marijuana use could be dangerous to society decreased. Potential dangers listed included psychological habituation, impaired intellectual functioning, danger to emotionally immature and unstable people, impaired functioning to the point of dangerousness to others, dangerousness to adolescents and children, and increased passivity.

A total of 18 percent of the 272 subjects reponding to the question concerning reasons for possibly discontinuing marijuana use reported that there were no negative consequences that would raise the possibility of their discontinuing marijuana use. Reasons for possibly discontinuing, in decreasing order of frequency, included legal aspects, negative psychological aftereffects, drug habituation, proof of physical harm, lack of psychological need, and problems in drug procurement. Legal difficulties far outweighed any other consideration. The most common reason given by trial users and past users for stopping use was marijuana's production of negative and unpleasant effects. The second most common reason was fear of legal implications. Other reasons included incompatibility with lifestyle, lack of effects, and substitution of meditation. A total of 17 percent of occasional users, 9 percent of regular users, and 13 percent of daily users reported that they feared discovery by authorities; the heavier the use of marijuana, the more the concern over arrest. A total of 5.8 percent of the sample members had been arrested and 1.8 percent had been convicted for marijuana use. From the 482 subjects who answered the question concerning types of people they would be reluctant to see use marijuana, 6 general categories of people emerged. The categories most often mentioned were emotionally unstable people and children. Other categories included escapists, lazy and irresponsible people, those who do not want to try it, and "right wing" types.

CONCLUSIONS

A great majority of subjects did not believe their marijuana use had harmed them in any way, although a substantial number (34.5 percent) saw some potential dangers to society from marijuana use, as well as some potential dangers to themselves (21.9 percent). Moreover, although legal difficulties were mentioned as the factor most likely to cause current users to discontinue marijuana smoking, the majority of respondents pointed to the negative and unpleasant effects of marijuana as the most frequent reason for actually discontinuing use. Finally, heavy drug users were less reluctant than occasional users to see people introduced to marijuana.

Galanter, M.; Stillman, R.; Wyatt, R.J.; Vaughan, T.B.; Weingartner, H.; and Nurnberg, F.L. Marihuana and social behavior: A controlled study. Archives of General Psychiatry, 30(4): 518-521, 1974.

DRUG	Marijuana
SAMPLE SIZE	18
SAMPLE TYPE	Users
AGE	Young adults (mean age: 24 years)
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Experimental/descriptive survey
DATA COLLECTION INSTRUMENT	Questionnaires
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	23

PURPOSE

Many studies have shown that the short-term effects of marijuana intoxication are at least as prominent in the area of subjective experience and social behavior as they are in the area of cognitive functioning. Studies on marijuana's effects have involved psychometric measures in neutral laboratory settings, simulated social atmospheres, and retrospective questionnaire evaluations. In all these approaches, it is difficult to distinguish between those effects reported by subjects as influenced by the marijuana folklore of their subculture and those that have a physiologic basis that is not culture bound. This study investigated the effects of a single dose of marijuana on social behavior, using both marijuana and placebos.

METHODOLOGY

Thirty-six unpaid volunteer subjects free from psychiatric and medical illness were recruited for three sensitivity groups. Subjects had all smoked marijuana at least six times during the last 6 months and were experienced at smoking and inhaling tobacco cigarettes. The final sample for data analysis consisted of nine male and nine female subjects with a mean age of 24 and a mean of 3 years of college. Subjects were given natural marijuana containing 1.6 percent THC or

placebo marijuana. The appearance and odor of the placebo cigarettes were the same as those of the natural marijuana cigarettes. When smoking the cigarettes, subjects took deep inhalations over 2 to 4 seconds, maintained them for 15 seconds, and then exhaled. They paused for 5 seconds and then repeated the procedure. Three weekly sensitivity groups were each led by a different psychiatrist over a period of 26 weeks. Most data were collected after each of sessions 9 through 20. These meetings were run under three conditions: marijuana only, placebo and marijuana, and no drug, in a specified order. Group members were unaware of the sequence. For the placebo/marijuana condition, half the group smoked placebo cigarettes while the other half smoked active marijuana. The next week, the reverse was done. Data were collected on four aspects of social behavior: group atmosphere, group cohesiveness, subjective experience, and normative behavior. An analysis of variance was performed for each variable over the three drug states. Comparisons between drug states were made by applying Duncan's New Multiple Range test for multiple comparisons of means. The chi-square test was used to study subjects' responses regarding previous marijuana experiences.

RESULTS

Subjects' mean ratings of their "high" differed significantly for the different drug states. No significant physiological or psychological untoward effects were apparent during the intoxication period. Measures of group cohesiveness and normative behavior showed no significant drug effect. Subjects reported that their previous marijuana experiences made them happier, friendlier, calmer, more warmly responsive to others, more understanding of others, less hostile, and less able to pay attention. Variables that were significantly different in the three drug states were throat and mouth dryness, hunger, dreaminess, slowness of movements, and heaviness in the head. The subjects also felt themselves to be significantly less involved when in the marijuana condition than when in the drug-free condition. Subjects smoking marijuana viewed the other group members as happier and less involved than when the same subjects were smoking placebos. When subjects smoked placebos in the mixed marijuana/placebo groups, they saw the group as more tense and less relaxed than when the group smoked either marijuana or no drug at all. Although somatic sensory experiences and feelings of detachment were consistent in the marijuana condition, no consistent affective changes, increased insight, or increased feelings of cohesiveness were experienced.

CONCLUSIONS

Results indicate that marijuana is a mild psychotomimetic when administered in dosages generally used under social circumstances; higher doses may produce serious psychotomimetic effects among more unstable persons. Marijuana use resulted in a reduction of social involvement, although subjects felt themselves to be actively involved in their surroundings. No evidence was seen of an increase in cohesiveness among group members when they were intoxicated; use of the drug did not promote interaction among group members. In addition, no consistent affective changes or attitudes toward the group experience were found in the marijuana state. Findings do not support the idea that marijuana might be effective either as an adjunct to group therapy or as an antidepressant. Findings also show that placebo smokers' perceptions of the group atmosphere as more tense and less happy paralleled the experience of nonsmokers who find themselves with regular marijuana smokers who are intoxicated. The drug appeared to be nonspecified in its effects. Marijuana smokers' evaluations of their experiences are markedly affected by certain aspects of the folklore of marijuana smoking; smokers may perceive subjective experiences according to their particular attitudes.

Knight, R.C.; Sheposh, J.P.; and Bryson, J.B. College student marijuana use and societal alienation. Journal of Health and Social Behavior, 15:28-35, 1974.

DRUG	Marijuana
SAMPLE SIZE	168
SAMPLE TYPE	College students
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Not specified
METHODOLOGY	Survey--correlational
DATA COLLECTION INSTRUMENT	Questionnaire
DATE(S) CONDUCTED	Not specified
NO. OF REFERENCES	16

PURPOSE

Reports of the National Commission on Drug Abuse in 1972 and 1973 indicated a strong relationship between marijuana use among youths and social values, attitudes, and lifestyles expressing opposition to authority. The reports concluded that young adult users' attitudes toward themselves and society did not differ radically from those of their nonuser peers. However, related research suggests attitudinal and ideological differences between users and nonusers with great social ramifications. The present study examines the extent to which marijuana use by young adults is related to personal and societal alienation. Involvement in the marijuana subculture is also assessed.

METHODOLOGY

The sample consisted of 87 females and 81 males enrolled in a large State college. Subjects were asked to complete the survey questionnaire, which contained items measuring demographic characteristics, sociopolitical attitudes (political orientation, participation in mass political protests, reading of underground newspapers), and personal values (measured by ranking such values as comfortable life, meaningful life, equality, freedom, maturity, true friendship, and new

experiences). Alienation was measured by the following scales: the self-anchoring scale of Cantril for fears about self and the United States and two items each from a variety of scales measuring governmental alienation, mass culture, work ethic, marriage, and law and justice. Personal alienation and marijuana and drug usage were also assessed. The final section of the questionnaire included questions on police harassment and degree of personal drug use, perceived parental feelings about marijuana, perceived opinion of the mass public about legalization of marijuana, and perceived rationale of those opposed to legalization. Survey respondents were classified as nonusers, who had never tried marijuana; experimenters, who had tried marijuana once or twice; recreational users, who used marijuana regularly less than 4 days a week; and "heads," who used marijuana more than 4 days a week. One-way unweighted means analyses of variance across usage groups were calculated for each interval scale variable. Kruskal-Wallis one-way analyses for ranked data were used for each value across usage categories. Interval scale variables were then reanalyzed using a factor analysis.

RESULTS

Of the respondents, 64.3 percent admitted to drug use and 51.2 percent to regular use. A slightly larger proportion of females composed the nonuse category, and more males composed the head category, but the distribution of males and females did not differ significantly. There were indications that as the college students increased their risk they immersed themselves further in the drug culture.

Personal alienation appeared to be unrelated to marijuana use. In contrast, a significant relationship was found between societal alienation and marijuana usage; societal alienation increased as drug usage increased. Heads differed significantly from those in the other three categories, viewing the future and the American system pessimistically. Heads also reported experiencing more encounters with the police while intoxicated and having more friends arrested on narcotics charges than other groups. As expected, those individuals who reported being more involved in marijuana use than other groups held more liberal or leftist political orientations and read underground newspapers to a greater extent.

Factor analysis showed that three factors accounted for 27.2 percent of the variance: societal alienation, personal alienation, and age and naivete. Unweighted means analysis of variance comparing these factor scores across usage groups indicated that societal alienation increased with usage. For this factor, each usage group differed significantly from all others, while no significant differences were obtained on either of the two remaining factors. Value assessment showed that heads were radically different from the other groups, with extremely high rankings for freedom and low rankings for maturity. New experiences exhibited a rise in importance as marijuana use increased.

CONCLUSIONS

Frequency of marijuana use is closely related to involvement in a drug subculture. However, personal alienation is not connected to rate of marijuana use; basic trust in human beings, hopelessness, and cynicism seem to have little to do with drug use among college students. In contrast, societal alienation appears to be strongly related to marijuana use. Disaffection with the institutions of law, government, marriage, and the work ethic is most pronounced at the highest levels of marijuana use and decreases with usage. The value configuration for heads suggests that individuality and personal expression are highly prized, whereas maturity is anathemized and possibly regarded as a form of conformity to social norms that have been called into question. The positive relationship between societal alienation and marijuana usage is not surprising in view of the correlation between heavy marijuana use and the possibility of arrest. The implication of these findings is that marijuana usage is a polarizing sociopolitical issue.

Simon, W. Psychological needs, academic achievement and marijuana consumption. Journal of Clinical Psychology, 30:496-498, 1974.

DRUG	Marijuana
SAMPLE SIZE	88
SAMPLE TYPE	Users versus nonusers
AGE	Young adults
SEX	Both
ETHNICITY	Not specified
GEOGRAPHICAL AREA	Northeastern United States
METHODOLOGY	Survey--comparative
DATA COLLECTION INSTRUMENT	Edwards Personal Preference Schedule; questionnaires
DATE(S) CONDUCTED	1969 to 1972
NO. OF REFERENCES	19

PURPOSE

Although the personality of the marijuana user has been the subject of considerable theoretical speculation, relevant empirical research on the subject has appeared only in the last few years. Previous studies by the author show that marijuana users score higher than nonusers on autonomy, change, and aggression, while nonusers score higher than users on deference, order, and endurance, and that college grades of the two groups do not differ. The present study seeks to assess the generality of these findings by using a mixed sample from a nondenominational college in the northeast rather than a sample from a Catholic women's college in the northeast as previously studied.

METHODOLOGY

Between 1969 and 1972 a total of 414 subjects from 14 psychology classes completed a questionnaire that contained questions on subjects' high school grades, college grade-point averages, and frequency of marijuana usage during the previous year. Subjects also completed the Edwards Personal Preference Schedule (EPPS), one of the instruments frequently used to measure psychosocial needs. The needs considered are achievement, deference, order, exhibition, autonomy,

affiliation, intraception, succorance, dominance, abasement, nurturing, change, endurance, heterosexuality, and aggression. The two groups selected from the sample were a marijuana-using group of 44 subjects (32 males and 12 females) and a nonusing group of 44 subjects (also with 32 males and 12 females).

RESULTS

Analyses using t-tests indicated that marijuana users and nonusers differed significantly on 5 of the 15 psychological needs measured. Users scored higher on autonomy, change, and aggression, while nonusers scored higher on achievement and order. The two groups did not differ significantly on the other measures. Analyses also revealed that nonusers had significantly higher high school and college grade-point averages than users. Similar personality findings have been reported in other studies, suggesting that marijuana users, at least among the college population, have a relatively greater need for autonomy and change and a relatively lesser need for order than do nonusers. Differences between marijuana users and nonusers on the needs for deference and endurance found in previous studies were not found in the present study. Furthermore, the present finding that nonusers scored significantly higher on the need for achievement was not found in the previous studies. This latter finding is consistent with the fact that while nonusers had better college grades than users in the present study, no such difference was observed in previous studies.

CONCLUSIONS

Study findings support earlier reports that marijuana users have a greater need for autonomy and change and a lesser need for order than nonusers. However, differences for deference and endurance were not sustained. Because the stimulus antecedents and response consequences of marijuana use vary considerably among different groups of college students, investigations of personality similarities and differences between marijuana users and nonusers will continue to require systematic replication with samples from different populations.

Indexes to the Abstracts

Terms are indexed to the first page of each abstract in which they appear.

DATA COLLECTION INSTRUMENT

The specific instrument or scale used in the research reported by the study.

DRUG

The general and specific names of all drugs mentioned in the abstracts, as used by the author of the document.

GEOGRAPHICAL AREA

Organized by State; includes the cities, counties, or regions where the study was carried out.

INVESTIGATOR

All authors named in the citation to each abstract are listed.

SAMPLE TYPE

Terms that describe as specifically as possible the sample population studied.

SUBJECT

Terms that describe the subjects or concepts of the studies.

AGE, SEX, and ETHNICITY/NATIONALITY of the subjects are also indexed, as are the METHODOLOGIES employed in the studies.

Age

Data Collection Instrument

Drug*

*Drugs are indexed according to the way they are referred to in the article. Thus, ganja, cannabis, cannabidiol, THC, etc., have separate entries.

Ethnicity/Nationality

Geographical Area

Investigator

Methodology

Sample Type

Sex

Subject

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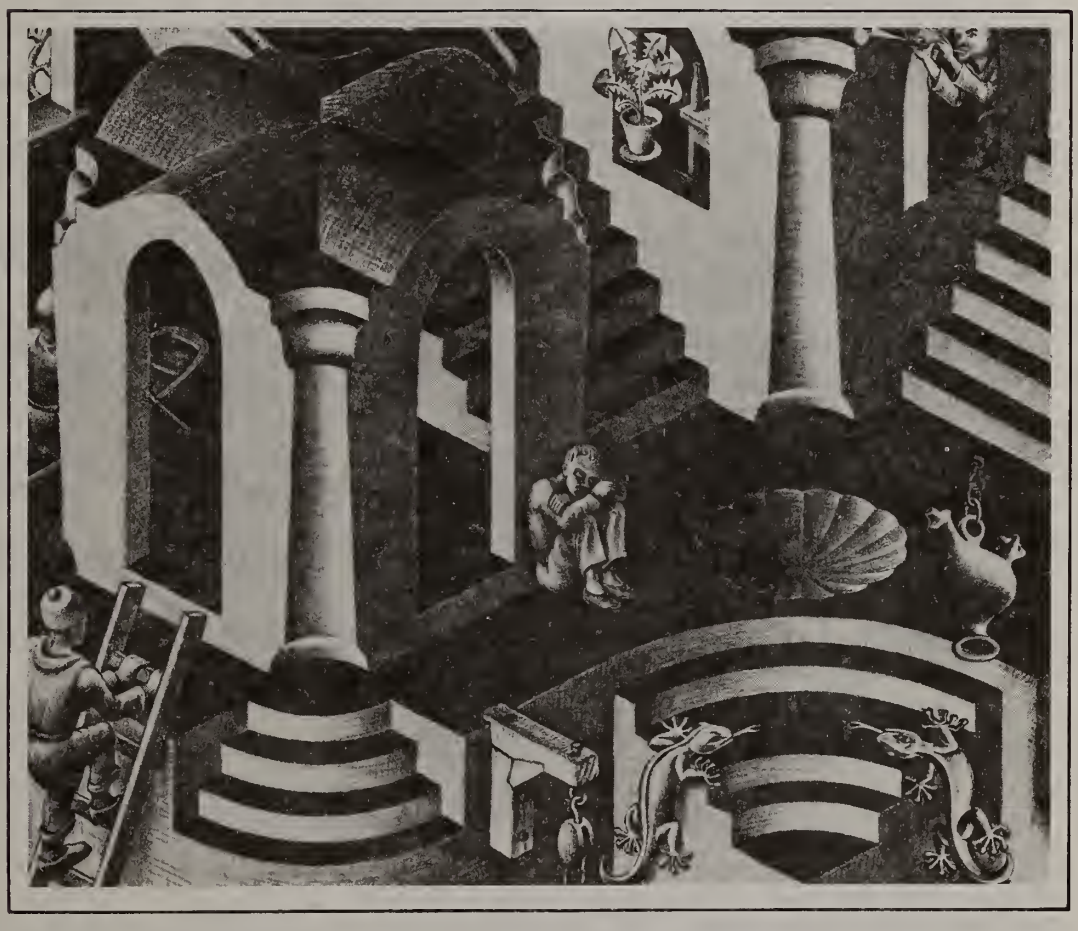

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